
G-WHIZ

A Small, Lightly Loaded .15 Powered, Stand-Off Scale Biplane For Relaxed Sport Flying

DH-6

Before any of you scale purists begin writing in to complain about the scale fidelity of this particular model please let me explain its orgins. Its real genesis was as one of Walt Mooney's very fine peanut scale rubber models. Being a fan of Walt's articles on peanuts, I was really intrigued with the DH-6 when it appeared and noted that its fine lines, all straight, would make a nice R.C. job.

After noodling it for awhile, I settled on a 3X magnification, or Brazil nut scale, which made for a nice .15 size airplane and also matched a set of wing rib templates I already had on hand. It was only after I had drawn plans and begun construction that I discovered that Walt had made some extensive changes to adapt the airplane to rubber power. What evolved is a very, very semi-scale DH-6, but one helluva good scale (3" = 1") model of a peanut scale rubber powered airplane!

Aside from the fact that it is not exact scale, you must admit it makes a very interesting scale type airplane. The flying characteristics are excellent with no tendency to ground loop on take-off and a slow, stable flight. If you're an expert looking for a change of pace or a novice with hankering for something different, yet easy to fly, grab some balsa and have at it.

CONSTRUCTION

In describing the construction I will assume all pieces are cut out beforehand and describe just the assembly unless some special cutting instructions are required. Since weight is not a serious problem on this airplane, select your balsa with more of an eye to strength.

Fuselage:

(1) Laminate the 1/32" ply doubler to the 3/32" sides using contact cement then mark the location of the bulkheads, the cabane struts and engine mounts on the inside of each side (be sure to make a right and a left side).

(2) Epoxy the engine mounts to the sides and glue the 1/8" x 1/4" spruce along the bottom of each side.

(3) Assemble two forward and two aft cabane struts and epoxy them in place being sure they are properly aligned by checking against the plans and each side against the other.

(4) Glue the remaining longerons and uprights in place on each side except for the triangular stock behind bulkhead F5.

(5) After everything is dry or cured, lightly score the inside of each side at the aft end of the 1/32" ply doubler, just behind F5, and crack the side slightly to the center.

(6) Position bulkheads F3 and F5 on the top view of the plans and epoxy or "Hot Stuff" the sides in place being sure everything is positioned.

(7) Pull the sides into position at the tail and glue together.

(8) Install bulkheads F1, F2, F4, F6 and the top 1/8" square crosspiece in place.

(9) Remove from the plans and glue the floors in place between bulkheads F1 and F2 and between F2 and F3.

(10) Fit the triangular stock behind F5 and glue in place along with the 1/8" square crosspiece on the bottom.

(11) Glue the 1/8" sheet on the sides of F1, F2 and F4. Sand in the required bevel after they're dry and glue the top sheet in place.

(12) Install the tailskid assembly and F7.

(13) Glue the bottom sheeting, plywood gear mounts, top turtledeck sheeting and stab platform in place.

(14) Sand off all the ragged edges and install the 1/8" sheet on the nose and then the 3/8" nose block.

Wings:

All the wing ribs are the same except for wood thickness, so the easiest way to make them is to bolt blanks of the required thickness between two aluminum or plywood templates and sand them to shape. The false ribs were put on only as a finishing touch and may be left out if you so desire. The following is for the lower wing and upper outboard sections:

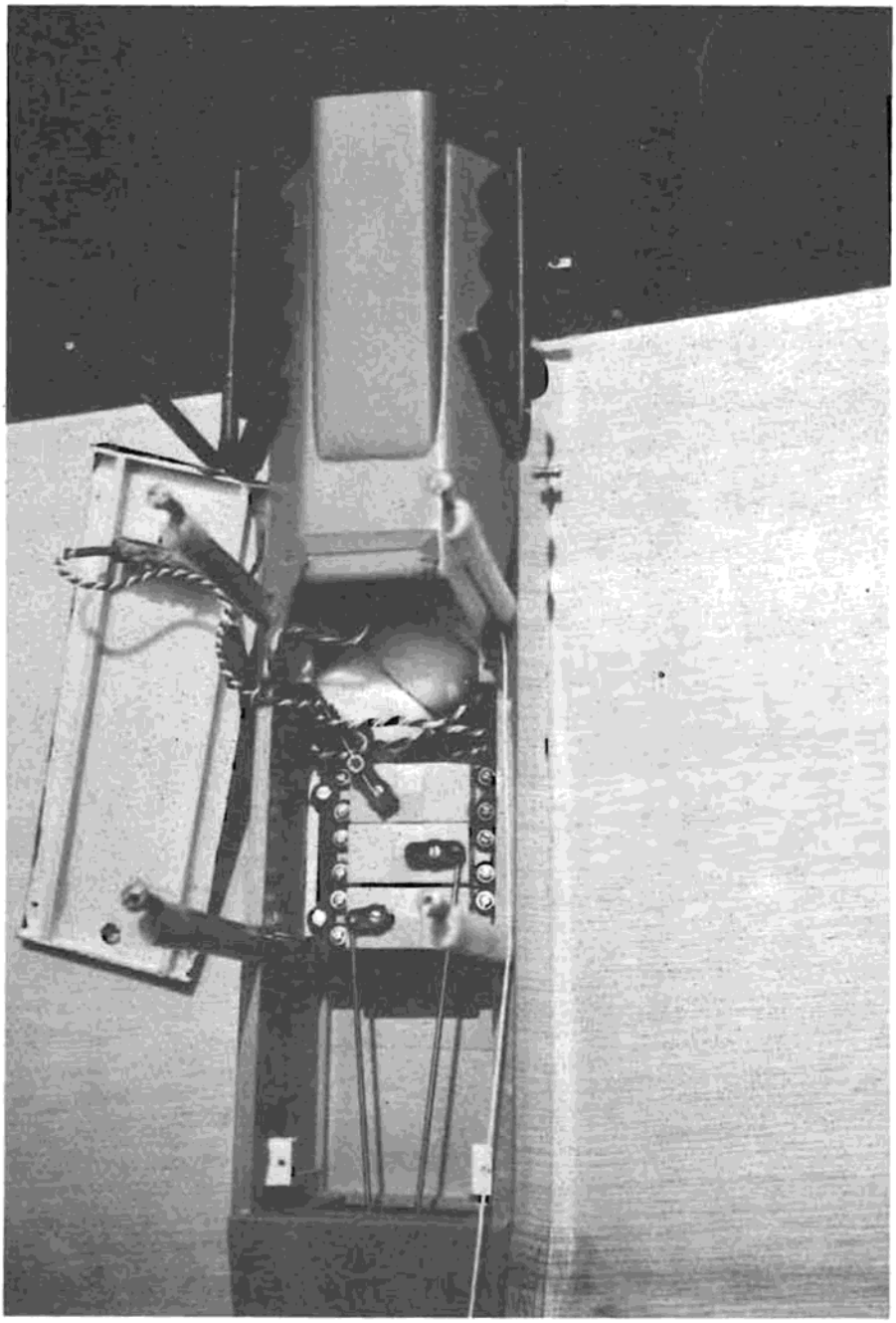
(1) Cut your trailing edge material from 2" sheet by slicing it down the center using a long straight edge; this will insure one straight edge.

(2) Pin the leading and trailing edges in place over the plans. Be sure to place the straight edge of the T.E. on the rear edge of the wing.

DH-6
Designed By: Paul Strengell

TYPE AIRCRAFT
Stand-Off Scale — Sport
WINGSPAN
39 Inches
WING CHORD
7 Inches
TOTAL WING AREA
540 Square Inches
WING LOCATION
Biplane
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, Each Tip
1 Inch
O.A. FUSELAGE LENGTH
30¼"
RADIO COMPARTMENT AREA
(L) 7½" X (W) 2½" X (H) 2¾"
STABILIZER SPAN
15⅞ Inches
STABILIZER CHORD (incl. elev.)
6½"
STABILIZER AREA
99 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
4⅜ Inches
VERTICAL FIN WIDTH (incl. rudder)
5 Inches (Average)
REC. ENGINE SIZE
.15
FUEL TANK SIZE
2½ Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Three
CONTROL FUNCTIONS
Rudder, Elevator, Throttle
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Ply, Spruce and Balsa
Empennage	Balsa
Weight Ready-To-Fly	42 Oz.
Wing Loading	11 Oz./Sq. Ft.



Simple three servo installation in Paul Strengell's DH-6. A vintage bipe with realistic flight performance for everyday sport flying.

(3) Pin and glue all the bottom cap strips in place; note the wider capstrip at the root ribs and the strut ribs.

(4) Pin and glue the bottom 1/8" x 1/4" spruce spar in place over the capstrip.

(5) (a) On the bottom wing sections only, glue all ribs in place being sure the strut ribs and plywood tubing support rib are in their proper location. Then glue in the top spar, the top trailing edge piece, the 1/8" square T.E. piece and all the top capstrips. This finishes the bottom wing sections except for sanding and fitting tubes.

(5) (b) On the upper wing sections install all the ribs except the root rib and the one adjacent to it. Install the top spar. Glue the 1/32" plywood strips on both sides of the spars at the center to form a box for the wing joiner spar. Be sure the spars are kept apart the proper distance to allow insertion of the joiner spar. Cut a 1/4" R-2 rib and a standard 1/16" R-1 rib apart and fit into their proper location on each side of the spar box. Install the top trailing edge piece, the cap stripping and the 1/8" square trailing edge piece to complete the top wing sections.

(6) For the upper wing center section, first mark the location of the cabane struts off to the side of the end ribs and then pin the leading edge, bottom sheeting and trailing edge on the plans.

(7) Pin and glue the joiner spar in place over the bottom sheeting.

(8) Cut and fit three 1/8" ribs to fit as shown. Be sure the end ribs are vertical.

(9) Glue the cabane strut blocks in their proper location along with all reinforcing pieces, then apply the top sheeting.

(10) Carefully sand the dihedral bevel on each root rib of all four wing sections (top and bottom). If you have a table or radial arm saw they are an ideal way to cut the bevel. If not, block up the tip one inch with the root rib aligned with the edge of your work bench and, using the work bench edge as a guide, sand in the bevel angle.

(11) Spread epoxy (do not use a water base glue like Titebond or white glue) on the joiner spar and upper wing root ribs and slide the outboard wing sections onto the center section. Pin the center section to the bench and block the tips to be sure you have the one inch dihedral under each section.

(12) Fill in the trailing edge of the first bay of each wing section with balsa and then install gussets as shown.

(13) Cut out the slots in the capstrip for the wing struts on each strut rib.

(14) Shape the leading edges and sand the entire structure. Wrap the upper wing dihedral joints with 1/2" nylon tape and glue.

Empennage:

The tail feathers really need no explanation, just make good glue joints to prevent warping. They could be made of soft 3/16" sheet, but this could result in some tail heaviness so use your own judgement.

Miscellaneous:

The landing gear is self explanatory, just bend and solder. The engine mount can be made from aluminum or plywood. The aluminum will probably vibrate less.

The wing struts just need to be rounded off and sanded. The dummy engine cylinders can be cut from 5/8" birch dowel or made any way that suits your fancy (they can even be left off). I bent the exhaust pipes from 3/16" aluminum tubing. Pack the tubing full of sugar and crimp each end closed with pliers (this will help prevent collapsing) and carefully bend around something of the appropriate diameter. Cut to the right length and remove the sugar (don't throw it away)!

Wing Assembly:

(1) Drill 5/32" holes in the fuselage for the lower wing tubing. Slide two pieces of 1/8" brass tubing through the holes and then slide the lower wings into place. Set the fuselage bottom flat on the bench and block each wing tip up 1" for the proper dihedral angle. Carefully apply 5-minute epoxy around each tubing inside the fuselage and at each wing rib they contact. After the epoxy has set, remove from the bench and saw the tubing in two at the wing/fuselage joint using a razor saw. Epoxy the tubing reinforcing strips in place in the wing sections and the fuselage.

(2) Install the hooks in the lower wing sections. After the hooks are dry, slide each section onto the fuselage using 3/32" wire wing rods; mark the hook location on the fuselage and drill it out to accommodate the hooks.

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(3) Drill through sheeting on the upper wing at each cabane strut block. Install lower wing on fuselage and then mount upper wing on cabane struts. Slip four small pieces of 3/16" tubing onto the spokes of each cabane, then screw the spoke nipples loosely onto each spoke. Tubing should be a rather loose fit in the cabane strut block, if not, remove wing and ream out a little. Position the top wing so it aligns perfectly with the lower wing when viewed from above, then 5-minute epoxy each tubing to lock it in place.

(4) After the tubes are set, remove the upper wing and glue the strut pads to the lower side of the wing. Place the wing back on the cabane struts before the glue dries to position the pads properly.

Covering:

If an airplane ever lent itself to MonoKote, Solarfilm, etc., this is it. I covered mine with silkspan and dope, but whatever suits you, tickles me to death. Since the DH-6 was originally a military trainer and reconnaissance plane, you can color it O.D., complete with roundels and red, white and blue rudder, or you can make it civilian as I did, with clear flying surfaces and a colored fuselage, or all one color such as red or orange. Please, no red, white and blue with stars! Be sure to fuel-proof engine compartment with clear Superpoxy or equal. Clear dope or Superpoxy should be used on struts.

Final Assembly:

Hinge the rudder, fin, stabilizer and elevator as shown. Glue rudder and fin to center of the stab, being sure everything is perpendicular. Fit rudder and fuselage hinge and assemble the empennage on the fuselage. Assemble front rubber band hook for the landing gear on the fuselage and temporarily band the gear to the fuselage. Make brass landing gear clips and install them on the rear L.G. strut. Position the landing gear until the axle is perpendicular to the fuselage and mark and drill the clip bolt holes. Install 4-40 blind nuts to hold clips in place.

Make the fuel tank by cutting down a Perfect #13 tank to about 2⅝" long and installing a new pickup and vent tubing. Mount tank in the position shown using two brass angle clips soldered to the tank. Install the servos using a tray or mounting rails glued to the fuselage, whichever suits your equipment best. Try to keep them as far forward as possible and still leave room for the receiver and batteries. Installing batteries may be a problem on some equipment so plan their location carefully. They must also be as far forward as possible. The position shown on the plans is ideal, but you may have to remove the plastic case and convert to a square pack if they are in the flat configuration. Use long Goldberg horns on the rudder and elevator. Using small servo arms, the outside hole on the elevator and the inside, or second to inside, hole in the rudder horn should give proper control movements.

Make the cockpit hatch cover as shown and paint it flat black. I installed the switch in this cover and mounted it (the cover) in the airplane with #2 sheet metal screws. Use "Hot Stuff" to mount the windscreen, cylinders and exhaust stacks in place. A little extra epoxy should be used on the connection between the exhaust and cylinders.

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Install the engine mount plate using #4 sheet metal screws. Depending on the engine you use (don't use anything larger than a .15), it will probably be necessary to make some modifications to allow room for the needle valve. For the O.S. Max .15, this amounts to cutting away a small portion of the nose bulkhead and soldering an extension on the needle valve. Hooking up the throttle should complete construction.

One note on installing the wings: Install both wings with the top wing spoke nipples loose, spread the panels apart and insert the struts carefully. After all struts are in place, install the rubber bands on the outer struts and tighten the spoke nipples.

Flying:

Now for the fun part. Check the balance, it should be on the wing spar, and check that all control surfaces are neutral. Clear up any warps by heating (gently) and twisting as necessary. Measure the distance between the wing leading edges and between the wing trailing edges. The leading edges should be about 1/8" further apart than the trailing edges. If not, shim at both the cabane struts **and** the outer wing struts until they are.

As I mentioned previously, weight is not too much of a problem. The original weighed 2¾ pounds and 3 pounds wouldn't scare me at all. Run the engine on the ground through all its ranges to shake everything loose that is loose and adjust the throttle for a good low idle (or you may not be able to get down).

On the first take-off be prepared to feed in a little right rudder for torque. After flying speed is reached, touch a little up elevator and you should be on your way. If your .15 is pretty healthy, you'll probably have to back off some on throttle or the climb may be a little steep, in fact, unless you use considerable down trim you rarely need full throttle even on take-off. Don't be surprised at the rudder control as it is not at all sensitive in spite of that huge flapper at the tail. Elevator is very smooth. Stalls are slow and mushy, but the sink rate at idle is pretty good because of all that drag.

I don't recommend any violent maneuvers in deference to the methods of construction, but it is capable of loops, rudder rolls, snaps and spins if you don't allow speed to build up excessively.

Landings are a dream because of the low speed and good sink rate. Just line it up with the runway and when you're about two feet off, start pulling up elevator until it settles in.

On dead stick landings, set up a real short approach or you may find yourself pretty short of the runway. Without any power the sink is even faster, so be prepared.

That about does it. I hope you enjoy your plane as much as I have mine. I'd appreciate any comments you might have, so drop me a line c/o RCM. □