

**DON PRENTICE'S
MAGNIFICENT
DEHAVILLAND BIPLANE**



TIGER MOTH

During the years of World War II, the DeHavilland Aircraft Company, and other companies, under contract to them, built more than 8,000 Tiger Moth training planes. The back-bone of the RCAF Commonwealth Air Training Plan designed to train air crews, used this aircraft as its elementary pilot trainer. To accommodate the harsh Canadian winters, the open cockpits of the aircraft were enclosed in a large greenhouse, the two center panels, of which , slid on rails to a position behind the rear cockpit.

This aircraft is still flying around the world and many present airline pilots, return to their original love of the open cockpit and singing wires by relaxing in these machines.

The model presented here is not entirely scale as compromises have been made to ensure flyability for a relative novice. A Clark Y airfoil has been employed to ensure a slow landing speed. The model, as a result of this airfoil, and large wing area, can be flown safely inside a football field. Its high sink rate on landing coupled with its response to throttle on take-off and high rate of climb make touch and go's a cinch in a small area.

The model relies on the interplane struts, landing and flying wires for the strength required for flight. Do not omit these details without strengthening the wing spars. The procedure used to hook-up the struts and wires is the result of 3 major design changes. The aircraft can be assembled on the field in a minimum time and without the use of turnbuckles. The engine, although space is available to invert it, has been left in the upright position, a compromise to ensure flyability without fuss. It is difficult to invert a biplane for engine starting without damaging the upper wing.

The major problem in the construction of a biplane is the installation of the upper wing and cabane struts. This design, with no outward slope to the struts, and with a center section fuel tank, permits the provision of a platform in this area on which the upper wing is installed.

This is not a beginners construction article. Only the specific points associated with the construction will be discussed. It is assumed that anyone selecting this model will be well aware of the normal construction techniques through previous experience.



FUSELAGE

The bulkhead 'key' assembly technique is employed to ensure easy assembly. The 1/8" ply doubler extends above 3/32" side panels in the area where the cabane struts are attached. Drill the holes for the struts and insert 2-56 anchor nuts on the inside for cabane struts. Ensure these holes are accurately located. The 1/4" plywood undercarriage mounts sit on the underside of the fuselage sides and doublers. Install 4-40 blind nuts to accommodate the gear. A 1/8" plywood insert is added to the bottom of the fuselage behind the rear wing to accommodate floats at a later date. The lower wing is held in position by 1/4" dowels at the front and Dzus fasteners at the rear. Build the lower wing prior to completing the assembly of the fuselage. It is easier to install the fasteners while looking down from the top inside the fuselage than attempting to do it after completing the model. Ensure that an oil drain is installed in the sump under the engine. Make sure this area is sealed so that oil will not leak into the fuselage. A fibreglass re-enforcing patch under the nose section will protect this area should a nose-over occur.

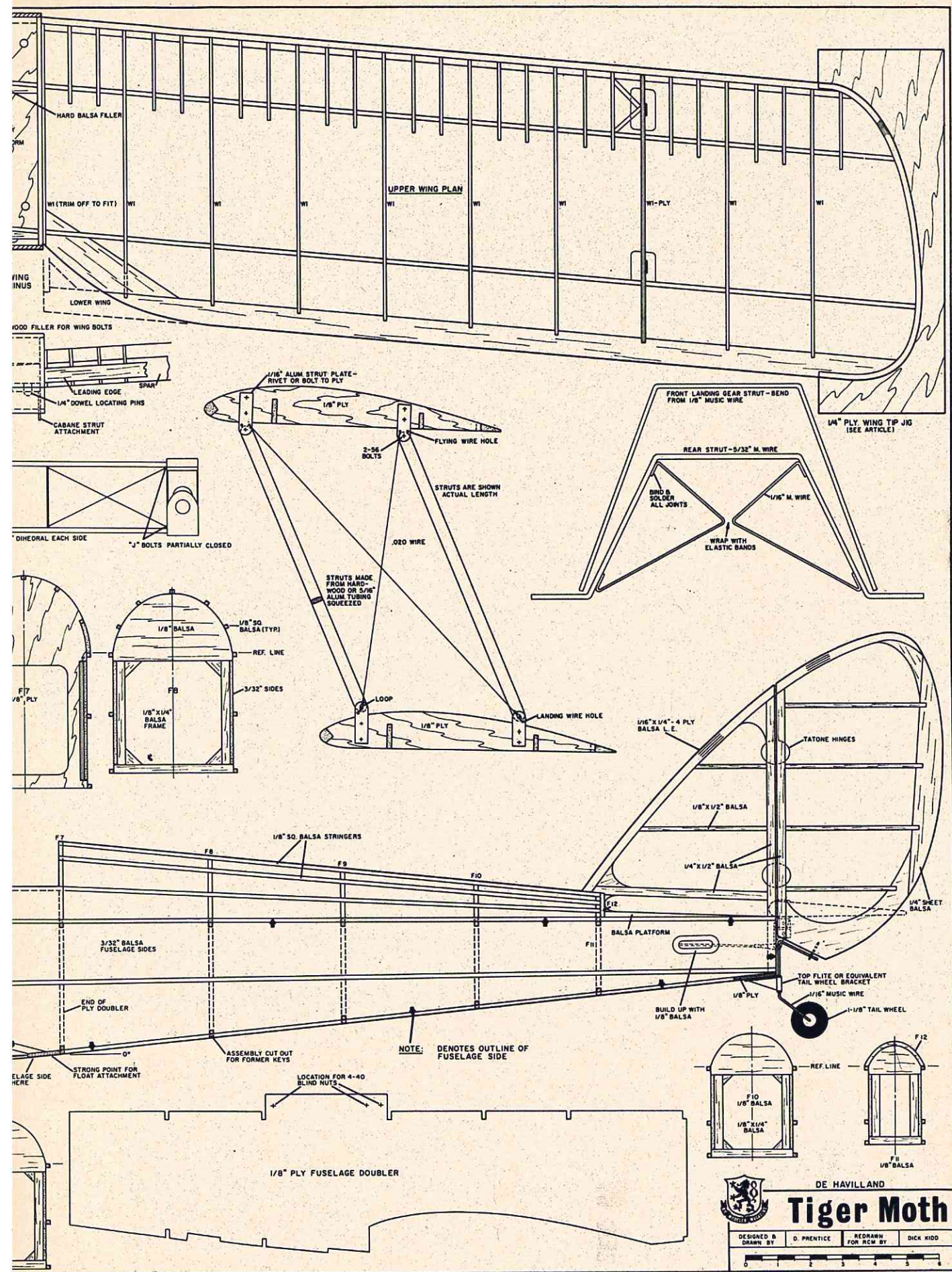
WING

No plywood is employed in the wings except for the ribs carrying the interplane struts. The plan shows the wings with no sheet covering except in the lower wing center section. Should the builder be concerned with warping, use the full rib section, omit the false ribs, and sheet the leading and trailing edges with 1/16 sheet, and cap strip the ribs between the sheet. This procedure will not provide the detail one likes to see in a biplane, but will discourage warping. The wing tips are laminated with 5 pieces of 1/32" x 1/4" balsa. Make a 1/4" plywood form as shown and, after soaking the pieces in hot water, coat with white glue and press the sticks into the form. Hold them in place with pins. Incidentally, attach the form to a piece of soft wood to accommodate the pins but be sure to place Saran Wrap between the form, board and sticks so that they

CONTINUED ON PAGE 75







(continued from page 34)

Flying:

The model is not extremely fast due to the 600 sq. inches of area with constant thickness airfoil, and the .40 cu. inch engine. It should make a good trainer for pylon racing, on take-off with full power it is necessary to hold a little right rudder to compensate for torque. In the air the Pinata responds faster to the controls than a pattern type model so beware! The landing speed is a bit faster than a pattern ship so make sure that you touch down on the first third of the field. Any flier that can get an R/C up and down (in one piece) by himself should not have any trouble flying the Pinata. The test model in the photos weighed 5½ lbs. complete.

The model in this article deals with the easiest type of a wing to construct, i.e. a flat bottom airfoil, constant chord, constant thickness wing. My experiments have shown that symmetrical sections and tapers are also possible with this construction technique. The idea of "stressed skin construction" is SIMPLE and it WORKS! I'm sure there will be other approaches to its use.

I can just see the wheels turning now!

TIGER MOTH

(continued from page 19)

may be rewound after drying. Build one wing tip each night for 4 nights. The ailerons in the lower wing panels are built-in during construction and are cut out after sanding. The plywood ribs are not installed until the wing is removed from the board. Prior to installing the plywood ribs manufacture the strut attachments out of 1/16" aluminum and rivet or bolt to the ribs. These must be accurate to ensure wing alignment after assembly. Each wing panel is built separately and joined later using balsa gussets, etc. The upper half of the fuel tank is permanently attached and forms the joint for the upper wing panels.

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The plan shows the struts actual size. Manufacture the struts out of 3/8" x 3/16" hardwood or use 5/16" aluminum tubing squeezed to an oval shape.

Should aluminum be used, cut the struts to approximate length, squeeze to shape, and fill the ends with an epoxy filler to ensure the sides cannot be squeezed in further by the mounting bolts. The lower half of the fuel tank sides are constructed and the cabane strut attachments are installed. Be accurate. Assemble the cabane struts and lower half of fuel tank to the fuselage. Level the fuselage on the workbench and check for a 1° incidence angle on the upper flat surface of the tank assembly. If it is not close to 1° your measurements are out, so start adjusting by filing elongated slots in one end of the struts until the situation is corrected. Later fill in the elongated hole with epoxy and redrill. 2-56 bolts have been found adequate to hold the assembly together.

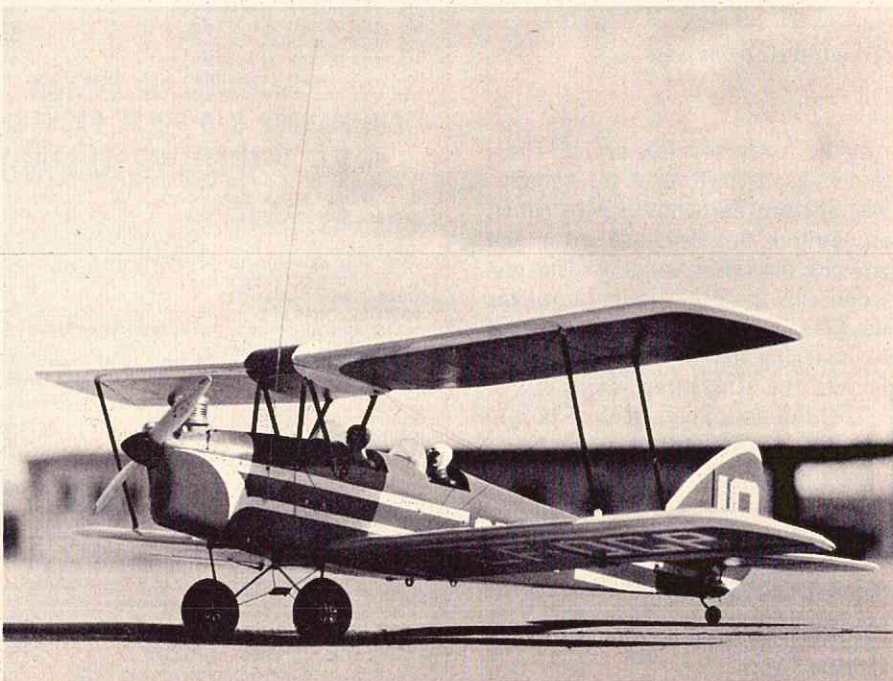
Tail Plane

The leading edge of the fin and the stabilizer are laminated in a manner similar to the wing tips. The large surfaces will warp readily so take more than adequate precautions.

Rigging

Since the landing and flying wires are required, correct rigging of this ship is mandatory. Incorrect wire length will warp the wings. The following is suggested. Install the lower wing, and without the undercarriage

installed, support the model on a flat surface with 1" blocks along both sides of the fuselage so that the lower wing area near the fuselage is supporting the assembly. Prop up the tail to ensure the flat surface of the wing is fully supported, place additional



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blocks under the wing tips. Weight the wing to ensure it does not move. Using .020 wire, attach one end to the wire hole in the front strut fitting, extend the wire to the hook at the lower tank section and return it "V" fashion to the rear strut fitting and attach per-

manently. Ensure the wire has no slack nor should it be excessively tight. Repeat the process for the other wing. Now attach the upper wing and wing struts. If the struts are of the correct length, the upper wing will also be rigged automatically. Attach

the "V" rigging to the hook at the fuselage and rigging is now complete.
Assembly of Model

At the field, install the lower wing, hook up the landing wires by warping the wing upward. Install the upper wing, with struts attached (never necessary to remove them). Splay the struts outward, bend the wing down and attach the flying wires. Attach the struts and presto, the landing and flying wires are tight. The struts are attached to their metal plates with 2-56 bolts. Tapping a thread in the fitting will eliminate the need for nuts.
Flying

Be prepared for a crowd around the model. It always attracts attention. On take-off, take care of torque with lots of right rudder and on landing watch the nose over. Should you be unable to overcome the nose over, shorten the front struts on the landing gear. Be careful though, should you make them too short, take-offs will be more difficult. The model flies inverted with tail low just like the real ship and although it will NOT do the complete FAI pattern, more eyes will be on your ship than on the other fellow who is doing the pattern in a flawless manner!

