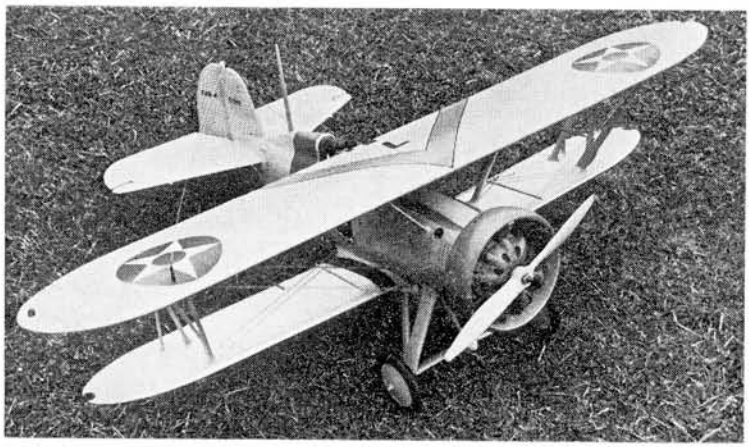


BOEING F4B – 4

a colourful, $\frac{1}{8}$th scale control-line model of the famous U.S. Navy fighter for 0.40-0.50 cu. in. motors

by **Ron Truelove**

THE BOEING F4B-4 is an attractive scale subject and, following construction and flying experience gained from a 44in. span C/L sport biplane, several features were incorporated in this version, which, at 1:8 scale, has the advantage of being a one piece model without being too cumbersome to transport.

The wing/strut/fuselage connections seemed from the previous model to be the key to the basic structure and it appeared that the following arrangement would be most satisfactory. It will be noted from the drawing that the lower wing halves are fitted onto the bottom fuselage taking their dihedral braces from the $\frac{1}{16}$in. ply former F4, whilst the upper wing, which is flat and in one piece, has its main spars securely fixed by 14swg piano wire to formers F2 and F4. This forms the basis of the wing/fuselage connections, and the interplane struts, aileron link rods and wing bracing wires are for appearance only and are therefore, only lightly glued in place. This system was proved on the sport biplane when it inadvertently landed on its right lower wing and completely demolished it, but left the remainder of the airframe unscathed.

Other features include a drooping undercarriage, which consists of lightly sprung telescopic legs – the spring assisting drooping only. Stronger springs, incidentally, would produce an unwanted bouncing effect upon landing. The glow motor, mounted inverted to reveal as little of itself as possible, was fitted with a home-made internally situated silencer, but this is something of a luxury as it takes a lot of precision machining to produce, and a commercial silencer (shown on drawing) is permissible in competitions anyway.

A standard *Roberts* three line system with upright plane unit (bellcrank) provides the linkage to the engine's throttle control, a must for this type of model. The scale spacing of the ribs adds a lot to the appearance of the model and is much easier to achieve than first appears, given a little organisation . . . The first items to build are the construction jigs for the built up ribs R2 and W2 (see sketch), so that to save time these ribs can be built during the construction of the fuselage. The jigs, consisting of $\frac{1}{16}$in. ply mounted on a softwood base, are well waxed with a candle before each rib is glued in place. To make the ribs, the two $\frac{1}{16}$in.sq. upper strips are glued together and pinned in place first, followed by the short strips (and triangular TE piece on W2), and finally the lower strips. The assembly is then put aside to dry, whilst attention is turned to the fuselage construction. By this method, the ribs can be built slowly without really wasting any time – when each rib is thoroughly dry, the pins are removed, the ribs cut to size, following lines marked on the jig, and carefully removed, ready for the next one. Thirty W2s are required and 22 R2s, plus a few spares of each.

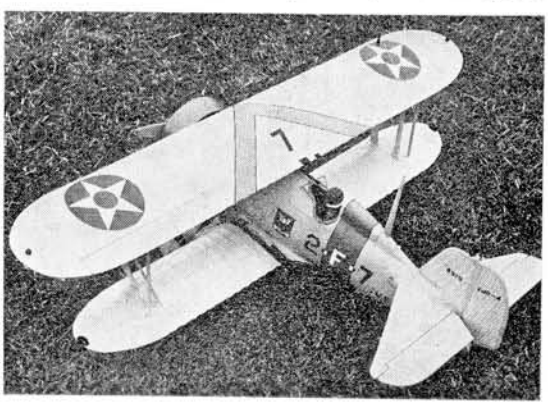
The fuselage is started by cutting formers F1 to F9 marking centre lines on same. Drill F1 to suit the engine mount, throttle pushrod and tank pipes, then assemble mount to former, and epoxy anchor nuts to the rear face. Remove mount when epoxy is set.

The plan shows two types of undercarriage: fixed or drooping. Select your choice, then bend 12swg main wire (one for fixed U/C, two for drooping) and bind with terylene cord and epoxy to F2, together with the 14swg front cabane wire, and 14swg centre U/C brace (one piece for fixed U/C, two pieces for drooping). Likewise the 14swg rear cabane strut wire is bent up and bound to F4 (note forward joggle shown on side view), but not epoxied at this stage.

Cut the $\frac{1}{16}$in. ply bellcrank mounting plate and screw to the *Roberts* plane unit. Bend leadouts as shown and assemble to bellcranks. Cut $\frac{1}{4}$in.sq. spruce bearers to length and mark positions of formers. Next dry assemble F1 to 5 to bearers, together with tank and bellcrank plate, and when satisfied slide each former slightly out of position, one at a time, epoxy and slide back – not forgetting the bellcrank. Check assembly for straightness and squareness, fuelproof front of F1 and put aside to dry.

Glue $\frac{1}{4}$in.sq. crutch members to F3, 4 and 5. Check alignment and allow to dry. Pin scrap $\frac{1}{4}$in.sq. temporary spacer across crutch at F5 and glue tail ends of crutch together – check alignment. Mark positions of formers F6-9 on crutch and glue in place, together with the tail wheel bracket and one $\frac{1}{4}$in. x $\frac{1}{8}$in. planking strip on underside to hold formers square. Remove temporary spacer when dry.

The tailplane is made from $\frac{1}{2}$in.sheet, hollowed out, or



built up from $\frac{1}{8}$in. thick strips, and when dry is rough shaped and sanded and the $\frac{1}{16}$in. sheet rib pieces added. The tailplane is glued to the top of F9 and the rear of F8. Check alignment and squareness. The elevators are made from $\frac{3}{32}$in. sheet, hollowed out or built up, plus $\frac{1}{16}$in. sheet ribs similar to tailplane. Hinge with nylon hinges, and join with horn assembly as shown. The $\frac{3}{16}$in.sq. pushrod has a fixed metal quick link at the front and an adjustable one at the rear; these are securely bound and epoxied in place. The pushrod is then inserted in the fuselage from the tail end, clipped in place, and the elevator control is set up and adjusted.

The fin and rudder are then cut from $\frac{3}{32}$in. sheet, sanded to shape and the fin is glued to the top of the tailplane and rear of F8, and the rudder to the rear of the fin. Note offset! Once more check for alignment and squareness.

The 16 swg throttle pushrod is now connected via a fixed metal quicklink to the *Roberts* bellcrank, the other end being dealt with later. The 14swg diagonal cabane strut wire can now be added, being bound and epoxied to F4, and bound with fusewire and soldered to the front cabane strut wire. Plank the fuselage with $\frac{1}{4}$in. x $\frac{1}{8}$in. strips. (It is recommended that any cockpit detail required be added before the final planking of the cockpit area).

Position engine mount on F1 and offer up the engine to determine position of engine mounting holes on the beams. Drill to suit and file flats where holes appear on the other side of the beams, to take nuts which are epoxied in place (the inner parts of 'floating' anchor nuts have been found most useful). The removable cowl will be retained by a 'Dzus' quick release fastener. This type is preferred because it pulls in as it locks. and requires a wire clip which can be made to suit almost any application. The fastener 'stud' in the Boeing is fitted to a small $\frac{1}{16}$in. ply plate by drilling in it an undersize hole and pushing the plate right home onto the small neck of the stud. The plate is then epoxied to the front of F1A, the wire clip being bent up and secured under the two lower engine mount fixing screws.

With former F1A, the engine, and mount in position, the cowl blocks can be carved and glued into place together with the dummy engine cylinders. The cowl joint is preferably cut after the blocks have dried.

The townend ring is built around a softwood former made from pieces of 2in. x 2in. glued together, rough carved and finished on a drill with a lathe attachment. (I later used this former for the core of a line reel.) The ring consists of three inner laminations of $\frac{1}{16}$in. ply plus four laminations of $\frac{1}{16}$in. hard sheet, all with their grain running across the width and their joints suitably staggered.

While this is drying the adjustable throttle link can be fitted to the engine and pushrod. When dry, the ring is shaped to the section shown and glued on to the dummy engine cylinders, the joint not being cut until all is thoroughly dry.

The undercarriage should be next, the fixed version being fairly straightforward, the 10swg axle having all the other legs and struts bound and soldered to it. The drooping version has a two piece axle, pivoted at the centre and sliding in a tube at the bottom of the telescopic leg. The leg consists of three 12swg wires, two previously fixed to F2, and the third sliding up and down, using the ply former as an upper stop.

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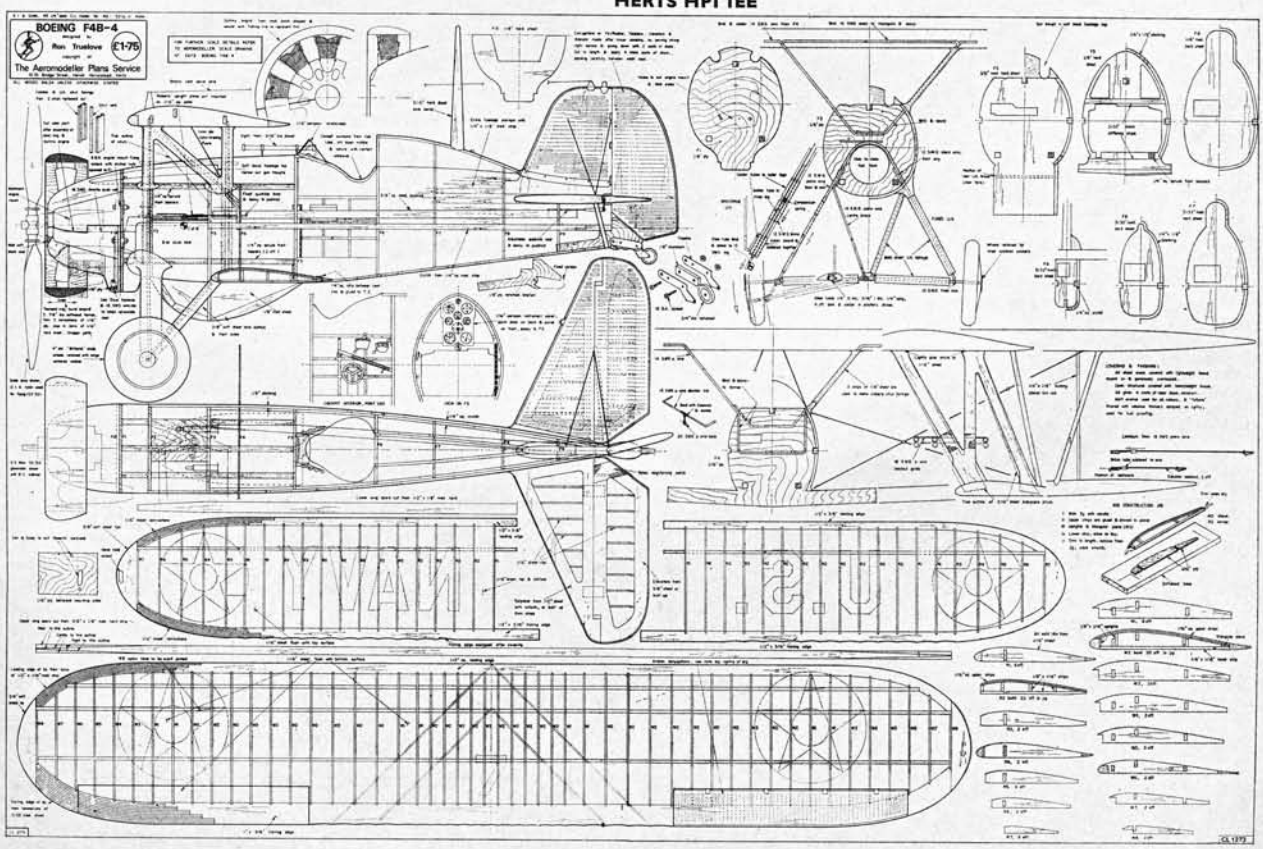

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A very attractive machine, and colourful too in its livery of yellow, grey and blue, this model is a crowd-puller wherever it appears. Tail-surface corrugations are easily duplicated by string doped in place - as detailed on the plan. At 45in. span, this model is nicely compact and will fit inside most cars despite being 'one piece'.

Three groups of three 12swg brass tubes bound and soldered together provide the guides, the upper and lower set being soldered to the outer legs and the centre set being soldered to the middle leg. A compression spring overcomes any reluctance to droop. The tail wheel leg can be made from $\frac{1}{8}$in. aluminium and tin plate held together with two 10BA screws, and pivoted to the bracket with an 8BA screw. The remaining blocks can now be added to the front fuselage followed by the fairing for the U/C and cabane struts.

Construct the lower wings by cutting out ribs R1, R3 to 7 and main spar (assuming the R2s have been previously built in the jig as suggested). Slide ribs onto spar and glue in place, pinning the whole assembly down over the plan, packing up tip ribs as necessary. Notch $\frac{1}{2}$in. x $\frac{3}{8}$in. leading edge for ribs and glue in place, similarly the $\frac{1}{2}$in. x $\frac{3}{16}$in. trailing edge. The outer parts of the LE and TE are laminated from $\frac{1}{16}$in. sheet to produce the large radius curve towards the tips. Start with the lamination that abuts the end of the ribs, and work outwards one lamination at a time, pinning and glueing generously as you go. Fill in between ribs with scrap pieces. Add $\frac{1}{16}$in. sheet strut supports in between R1s, flush with top surface of wing. Clean up, add $\frac{3}{8}$in. sheet tip, shape when dry and sand whole wing.

Construction of the upper wing is similar to lower wings except that there are three spars and the ribs are labelled 'W' to avoid confusion with the lower ribs 'R'. The LE is $\frac{1}{2}$in. square, the TE is 1in. x $\frac{3}{16}$in. and the strut supports are flush with the bottom surface of the wing. The spars are longer than 36in. and have to be scarf jointed as shown, and the trailing edge laminations are $\frac{3}{32}$in. sheet.

Final assembly of the wings to the fuselage is commenced by glueing on the lower wings. The fuselage should be stood on the building board with its centre line level, and when the wings are assembled their tips should be 1in. higher than the root rib. The LEs are glued to the rear face of F3. The TEs butt to each other with a $\frac{1}{4}$in. square reinforcing strip between the root ribs and a slot needs to be cut in the wing to take the brace on F4. Before the glue sets, check for correct angle of incidence and alignment with tail.

The upper wing has to be slotted to take the cabane wires to the front and rear spars, to which they are securely bound and, when the incidence and alignment are satisfactory, epoxied in place. Make good the remains of the slots with scrap $\frac{1}{16}$in. sheet. The 'under-belly' tank can now be built from $\frac{3}{8}$in. and $\frac{1}{8}$in. sheet as shown, and the various fillets made from a combination of soft block and Polyfilla.

Covering on the fuselage, fin and rudder etc. consists of generously overlapped pieces of lightweight tissue doped to the sanded structure. The wings and tailplane are covered with heavyweight tissue and given at least four coats of clear dope, as is the fuselage.

The imitation corrugations can now be added, by doping string to the tissue as shown. The interplane struts and dummy aileron links can now be lightly glued in place together with the pole aerial, tailplane struts and other scale details as required.

Finish and markings are very much the choice of the modeller as the Boeing comes from a very colourful era. The outlines of national insignia, large lettering and colour bands were painted with a ruling pen and ink compass, the remainder being filled in with a brush. Humbrol matt enamels were used throughout, while the fuel proofer used was Ripmax 'Tufkote' thinned with cellulose thinners and sprayed on lightly to achieve a matt finish.

Being a short nose aeroplane, the cowl may have to be packed with lead to get the balance point correct, but do not skimp on this as it could be fatal to take to the air tail-heavy.