

a freeflight scale Roland Walfisch

Fishing around for a F/F Scale win?
Try this WWI biplane for bait!

By Dave Rees



PHOTOGRAPHY DAVE REES

I love World War I airplanes. During no other period in the relatively short aerial history are the aircraft more colorful, more varied in design, or more suited to construction as a rubber powered free flight scale model than those from 1914 to 1918. Nearly any modeling subject you choose from WWI can be painted screaming red, purple stripes, checkers—or that ultimate example of virtuoso scale modeling—lozenge camouflage. The question then becomes how to select a subject that will not only be a successful model, but will also have enough charisma to go all the way to the top levels of competition at the Nats, either AMA or FAC.

The *Walfisch* is a relatively obscure design with a lot to recommend it. Let's see if I can con you into building one. Long noses are fairly infrequent in WWI airplanes due to the widespread use of the rotary engine with its better power-to-weight ratio. The six cylinder in-line-engined types, such as the *Walfisch*, have better moments, require less ballast, and create less drag than rotary-engine ones. Those perennial areas of fragility—the wing cabanes and struts plus the landing gear—were all ingeniously circumvented by the *Walfisch*'s designers, which should prove advantageous to the modeler as well. The fuselage was made tall enough to attach top and bottom wings solidly to it directly with no cabanes at all. The wings are closer together than usual as a result, but do not dismay, the Reynold's numbers at which rubber scale models are flown are so low that intra-wing flow disturbance is not likely to be a factor. The interplane struts are sturdy sheet rather

than the normal collection of rather flimsy sticks. How am I doing? The landing gear is widely triangulated and well integrated into the fuselage to absorb those devastating hot downwind landings. The gear is also long enough to be able to use a really good-sized propeller and still take-off if necessary. (The present AMA rules fortunately permit biplanes to be handlaunched, which is a bonus advantage for the *Walfisch*.) The stab has enough area to use with no enlargement at all, assuring no loss of scale points in AMA rules.

In fact the *Walfisch* has been transcribed directly from the 3-view at the scale shown, with the only deviation being the additional 5° dihedral. Zero dihedral simply will not be stable in this configuration; save it for the *Fikes* and *Laceys*. Notice the relatively few rigging wires compared with the usual WWI design. Simple and trouble free.

Last in its list of virtues is the architectural detail which can be lavished on the *Walfisch* for lots of dazzle and pizzazz to even the most experienced of judges. There are seven distinctly different color schemes that I know of; maybe more if you want to dig a little. But if all of the above doesn't convince you — wait till you see it fly!

Walfisch history

There were only 275 *Walfisches* built, which makes them a rather insignificant speck in the eye of the beholder, when viewing the thousands of Fokkers, Nieuports and Sopwiths built during the great war. It was its innovative concepts and clean lines which gave it fame disproportionate with the few

actually in service. The first production aircraft were delivered in March of 1916 and their speed with the 160 horsepower Mercedes engine was astonishingly equal to the Nieuport II and Sopwith *Pup*—with two men and a full military load! Their speed made it impossible to fly in formation with the *Albatros*, *Rumpler* & *LYG* types then in use at the front. But this performance was not without drawbacks. The high wing and power loading made the *Walfisch* a tricky item to land in the typical German airfields at the front, which were little more than small clearings. The wing position, while providing unsurpassed upward view for the crew, blocked the view of the ground during landing, so obstructions were difficult to see in time. Most casualties were from landing rather than air-to-air combat. The level of inexperience of most pilots at the front undoubtedly exaggerated the problem. As a long range reconnaissance machine it proved very difficult to intercept and two *Walfisches* were customarily sent on such missions. Aircraft were changing so rapidly, however, that by October 1916 the production of *Walfisches* was halted after being considered "outdated". Secondary duties and training service kept them in use well into mid-1917 before dropping from sight forever. (Ref: Profile Publications Ltd. #163)

Construction

The plan has been drawn in three-view style so the subject can be seen assembled and fully detailed. Build everything right on the plan as you normally would. I recommend starting with the tail, since it is the most straight-forward to build. Use 3/32 square balsa for all the structure, bearing in mind that tail parts should be the lightest in the model to avoid tailheaviness. I bent the outlines over a 75 watt soldering iron after first soaking them a while in water. When the glue is dry, round all the edges with sandpaper, and cover with white Japanese tissue. Alcohol-shrink the covering only, as water will probably warp the light balsa framing. Hot Stuff the hinge wires in place to one side first, then the other. Set the stab and rudder aside until the painting phase.

The wings present few construction problems for persons familiar with "deep spar" open rib style. The lightness of this method is necessary because a biplane always carried the added weight of the additional wing when compared with an equivalent monoplane. If the both wings can be built half as heavy, you will not take much weight penalty. A nice feature of this design is that every rib is exactly alike. Make up an aluminum template .020 inches thick matching the rib outlines. This template should be used to cut the upper ribs, all fifty of them, from light 1/20th sheet. I shaped the leading and trailing edges while they were still attached to the sheets from which they were cut. This avoids the need to do much sanding after the wing structure is glued together. The bamboo tips may not be familiar to you, but they are actually quite old, originally being used in designs of the thirties. They are bent similarly to those in the tail around a soldering iron, providing a seamless, warp free wingtip that is almost indestructible, but very light. Notice that the tips taper evenly from the bottom and top of the wings. Notch the spar ends in their centers, and bend the bamboo into a 1/2 high airfoil when viewed endwise to the wing.

The wings can be glued up from start to finish in one piece without stopping. Pin

down the leading and trailing edges, then glue in the lower rib members of 1/20th square like rungs of a ladder. Glue and pin down the two spars and continue by gluing in the upper curves. These are difficult to pin, so use small weights such as pennies or 1/4 inch nuts laid at each end until the glue dries. Since there is a rather large chunk of wing missing in the vicinity of the fuselage, the wing must be braced with diagonals to maintain structural strength. The 1/64 sheet gussets also help. Glue these in place, using a pair for the upper and lower surfaces of each wing. Using the grain vertically, box in between these with 1/64 sheet also. You will find the wings will be strong enough at the centers with this construction.

When the glue has dried, make one cut in the center of each wing and re-glue at the dihedral dimensions shown. Don't forget the scrap balsa joint doublers in each spar. Lightly sand the finished wing frames and cover with white Japanese tissue. Set these aside until painting time.

Now that you have built this much of the airplane, you can't stop without losing all that effort, so I have saved the hard part for last—the fuselage. The full-sized *Walfisch* fuselage was one of the first to use the molded shell plywood design of incredible strength and rigidity for the times. This is hard to represent in sticks and tissue because all surfaces are curved. Twenty stringers are used, counting the keels, which computes into an equivalent volume of one 3/16 square stick. The stringers must be no heavier than medium (six pound/cubic feet) or it will become a "lead sled".

First pin down the fuse outlines using 1/20 sheet 3/16 wide. Cut the curved parts from sheet; don't try to bend straight sticks. While the glue is drying, cut out the former halves from 1/16 sheet. Glue them all to the

keel using a small block to check each one for vertical position while drying. Note that the top keel is *not* cut away at the open cockpits. It is there for two reasons: to maintain strength and to mount the pilots on. You may now glue the 1/16 square stringers in place, starting from the center outward. Ignore the wing cut-outs—just run the stringers anyway. These will be cut off later. When dry, trace the fuse outline on the opposite side of the paper by holding it up against a large window (during the daytime!) Repeat the above steps for the opposite fuse side. When the glue has dried, glue both halves together, pinching both keels together with paper clips and pins to make a tight glue joint. If you have used good wood, the vertical centerline should be perfectly straight. Remove clips when dry and sand everything smooth using 400 sandpaper.

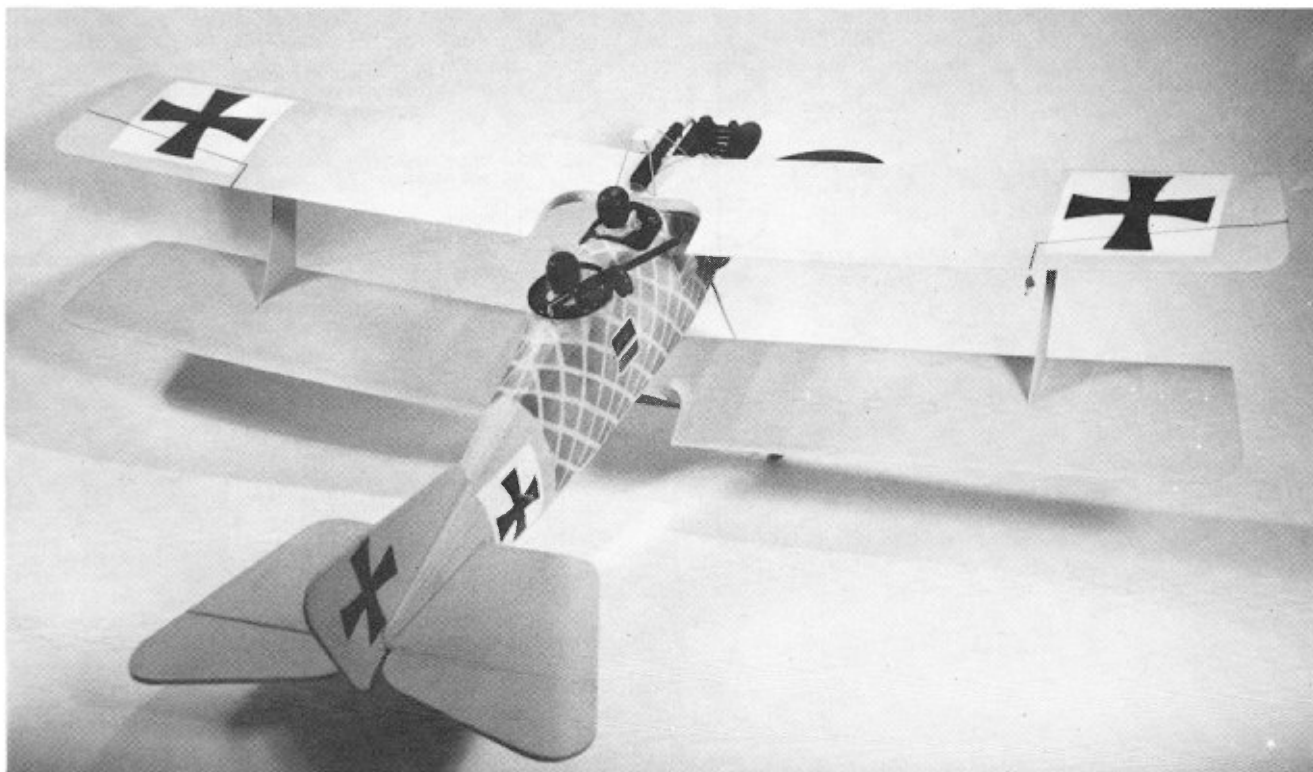
You are now holding a fuselage whose shape closely resembles a be-headed shad. Add the 1/16 fill where shown for the rear peg, drill the peg hole, and saturate the area with Hot Stuff for strength. Slot the rear fuse upright and slide the stab into place. Next fill around it with 1/16 sheet to the nearest stringers. Remove the stab. Make up the two wing saddles from 1/32 balsa and glue to each side of the keels. Fill to the nearest stringer with 1/16 balsa for support. Now you may cut away the stringers which cross these openings. Sand all to the fuse contour and try the wings and stab for alignment. There is no easy way to do the above filling except by patient craftsmanship until it looks right. The pilot's opening is filled and cut out in a similar manner. The observer's ring is best done with a soft block. Cut the stringers where shown between formers 5b and 6 and glue two blocks in place which have had the inner curve cut in them. Carve to the fuse contour and sand smooth. The nose blocks

are glued between formers 1 and 2 paying attention to the grain direction. Sand to shape.

Take care to get a tight fit for the nose plug. More rubber ships fly inconsistently because of loose plugs than for any other reason. Sand the edges of the 1/32 plywood to match the fuse curvature well. I recommend using a ball bearing thrust washer, because large motors, like this plane uses, will produce sufficient force to wear the back off the plastic propeller. Notice the plastic hobbin to prevent the rubber motor from climbing the hook and shaking the airplane to pieces. Always scrape the plastic prop blades until balance is achieved, and try for a minimum of shaft wiggle in both prop and nose bearing tube.

The landing gear is last to be installed. Bend up the .025 music wire using the patterns I have drawn. Slide them thru the formers and stringers and glue in place with sandwich formers clamped by spring clothespins. Apply Hot Stuff liberally. Do not use heavier wire—you want floppy gear so a rough landing won't tear the bottom out of the fuselage. Buy some vinyl insulation tubing at Radio Shack or strip some off of a wire with the right diameter. This should be slid onto the music wire to add bulk, thus resembling steel tubes while remaining indestructably flexible. *Do not* cement the gear legs together yet, or you will be unable to get the lower wing thru the gear. Add the tail-skid and its smaller sleeving. You are now ready for covering.

Since there are no protuberances, the fuselage is actually fairly easy to cover. Cut the tissue into gores spanning the center five stringers on each side and apply with the tissue wet with water. Cover from these stringers to the keels in pieces, until covering is completed with no wrinkles. A painstaking task at best. Now it really looks like a white



One of the most appealing characteristics of the World War I era were the very distinctive aircraft paint schemes such as Dave Rees' *Walfisch*.



There's a lot to recommend the *Walfisch* as a modelling subject; longer than usual nose moment, no canopies, widespread gear, and little rigging.

whale, doesn't it? While this is drying, cut out two interplane struts using the shape shown on the side view and sand smooth.

Painting and detailing

The background color is first. You can apply this in either of two ways: 1. spray a well-thinned coat of clear dope onto all parts of the model; then spray that with a light coat of Pactra Aero Blue enamel or, 2. spray everything with two coats of Pactra Aero Blue flat dope. That's it—either one or the other and nothing more or the weight penalty will be too great. I used the former because I get greater warp-free longevity in the enamel with only a few grams added weight. Don't do any assembly yet, you still have to paint a picture on this blank canvas.

The fish scales on the fuselage look almost as difficult as lozenge camouflage, but believe me, they are not. Begin with an $8\frac{1}{2} \times 11$ inch piece of graph paper which is printed with $\frac{1}{10}$ inch squares. Squares of $\frac{1}{4}$ inch can be used too and are easier to find. The objective is to make a grid of $\frac{1}{10}$ inch wide slats on $\frac{1}{2}$ inch centers. Using a sharp X-Acto knife, cut out $\frac{1}{10} \times \frac{1}{10}$ inch squares leaving $\frac{1}{10}$ inch webs between each. When all the squares in the sheet are cut out it will look like a page of lace. Next, mix up an airbrush full of Pactra Insignia Blue enamel. Mask off the belly part of the fuse on one side plus the tail and head ends as shown on the plan. Tape and hold the grid at a 45° angle to the thrust line and lightly fog a thin coat of blue over the grid. Spray so that the forward corners of the squares are denser than the rears to heighten the illusion of "scales". Stop spraying thru the grid approximately on the centerline at the fuselage top. Remove the masking and repeat for the other side, trying to match up the grid intersection as well as possible at the centerline. That's all there is to it.

The insignias are the last to be painted. Stack four $8\frac{1}{2} \times 11$ sheets of typing paper on top of each other and cut a precise $3\frac{1}{16}$ inch square hole in the center thru all four

sheets. Cut a $1\frac{1}{16}$ inch square hole in two more sheets. These are next positioned on the wings and fuselage using light coats of rubber cement for the white insignia fields. Spray on just enough Pactra insignia white flat enamel to achieve a good white color, then remove masks and roll off the rubber cement. Cut more sheets of typing paper in the iron cross shape shown on the plans and spray Pactra Flat Black enamel for these. Make up a mask for those adorable eyes and mouth while you're spraying the black. Cut the side windows in the tissue with a sharp razor blade and glue cellophane edged with grey card stock over the openings using Ambroid.

All that remains is final assembly. Spread the landing gear legs slightly and slide the lower wing into place. I prefer Ambroid glue for final assembly because it is a little more

flexible than Hot Stuff. Slip the rear landing gear wire ends into the sleeves of the front legs and cement with Hot Stuff. This joint will be just about as strong as a wrapped solder joint and a whole lot lighter. Glue the tail members to the fuse next. Using a sharp razor blade, slit the paper between the double ribs on the underside of the top wing and the upper side of the lower wing. The interplane struts can be forced into these spaces and the whole upper wing installed "loose". Align all these parts carefully and glue the top wing to the wing saddle in the fuse. The struts are best fastened by flowing a thin line of Hot Stuff onto both sides of the slot in the wing, cementing everything up rigidly.

Add the rest of the details including wheels, cockpits, pilots and guns, making these non-functional items as light as you can. Notice that I have omitted the X-braces



Packing in the winds. Dave used two loops of $\frac{3}{16}$ by 30 inch long rubber in the *Walfisch*. Braid the motor about 100 turns, then crank in 300 turns for initial trim flights. Maximum turns run about 1400.

in the rigging between wings. This was because I couldn't find a good anchor point at the fuselage, and was afraid that if anything snagged on the rigging it would tear up the wing. Use your own judgment here.

Flying

This is a fairly big airplane so pick a flying field large enough for the *Walfish* to maneuver in. My prototype weighed just under 60 grams; if your's is at least this light, it should fly very well indeed. If heavier, the next size smaller prop (8 1/4 inch) should be substituted which will reduce duration since the RPM will be higher. Make up a motor as described on the plan, braiding it about 100 turns. This length conforms to the 2 1/2 times the "hook to peg" distance rule and should be about the maximum the airplane will handle. I tried a 36 inch long motor at Westover and got severe rubber lash as a result. Use a cardboard rocket tube for protection while winding. Crank in about 300 turns, kneel down, and gently launch the *Walfish* in the least amount of wind available. Look for glide performance first, and adjust the tail surfaces or ballast until this is under control. Repeat flights for as many times as necessary to achieve a perfect glide. Sometimes I may take a week of evenings to get what I want from a particular airplane. Then gradually begin increasing the number of winds and observing what occurs as speed and torque are raised. Do not change the flight adjustments; work only with the thrust trim. For example: if a tendency to spin to the left from torque develops, add right thrust until it is eliminated or reduced to a gentle turn. The nose plug on this *Walfish* was designed to stay in



Notice how the airplane and the pilot begin to grimace alike after being together for a season! Dave better get used to it because the plane, if cared for properly, should give you three to five years service.

place, so thrust adjustment will require some shaving of one side and filling on the other. Once you have it correct, it is not likely to change on you, however.

Do not rush things, it may take quite a while and perhaps 50 flights or so until reliable flight is achieved. It also takes time between flights to think and analyze what is happening and how best to correct problems. But don't stop before this dependability is reached. The winners in today's meets don't do it with one lucky thermal flight. Many pa-

tient hours were spent on every airplane before the meet. As a goal to shoot for, try to get a duration of one minute in calm air every time you fly it. You must have at least this much if you intend to fly in a mass launch event. Some airplanes can be trimmed to get 1 1/2 minutes consistently, but you alone will be the judge of when to stop because everything you try makes the time worse. Keep the *Walfish* in a box and out of the sun and you should get three to five years of service from it. C



The fish scale finish is not as difficult as it might seem. It was created using a graph paper mask. Darker color is Pactra Insignia Blue.