All fueled up and ready for the Dawn Patrol, the author's D-VI really could pass for its ancient big brother in this photo.

FOKKER D-VI

By PHILIP C. FOSTER

A somewhat rare biplane fighter from WW-I, the Fokker D-VI did see some action. The pleasing lines of this 2"=1' scale model make a great R/C project. Designed to be built light, it uses .40 size engines.

• The full scale prototype Fokker DVI was designed and built side by side with the famous DVI I during the winter of 1917-1918. Competitions for a rotary powered fighter and for an in-line powered fighter were held January 1918, and Fokker won both. The resulting DVII's story is known well but its cowinner lost out to its successor, the rotary-engined, parasol monoplane. Fokker DVIII. The DVI saw combat in limited numbers in various front line fighter units and with the Austro-Hungarians. References "German Aircraft of the 1st World War", by Gray & Thetford and "Development of Fokker Fights", M.A.N., by Robert C. Hare.

The specifications are as follows: Span 2*SVi* ft., length 20*A* ft., height 8 ft. 4 in., area 191 sq. ft., speed 122 mph, armament 2 spandau.

The model is not a spectacular performer by pattern standards. It is slow and insensitive to aileron. Its glide is quite steep with the thick pair of wings. The wide track gear helps keep her straight.
Tail high landings are pretty and straight.

And here is Big Brother! This photo of an original Fokker D VI was furnished by Pete Bowers, a fellow who is in no need of introduction among collectors of aeronautica ... or Fly Baby's!

I'm a WWI airplane buff of thirty-five years experience and this out-of-the-way model was built because I think it looks good and because most of the well known WWI craft have been built by others. The model is to 2 inch scale and is practically "built in". All surfaces come off readily, but mostly I just leave it assembled so I can admire it. The span is only four feet and the total area is 750 sq. in.

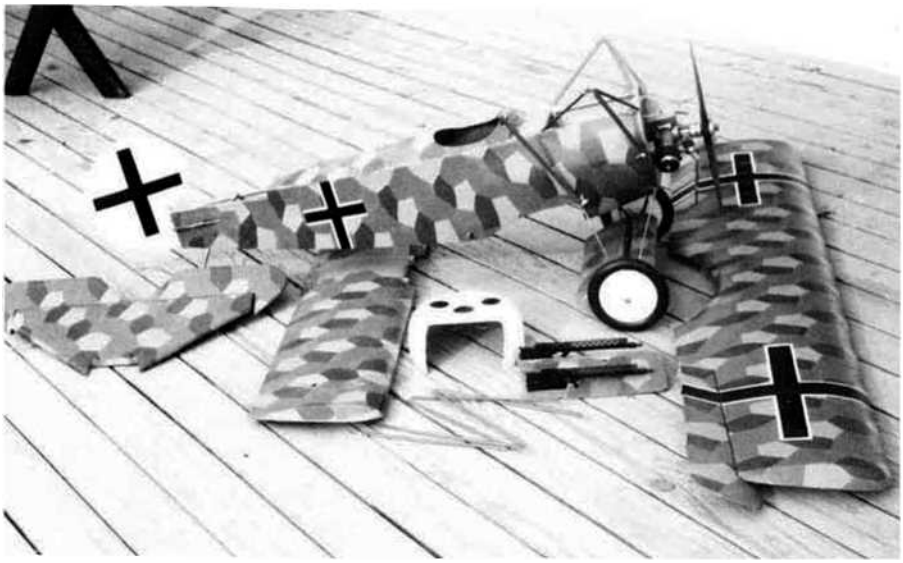
Color is hexagon day camouflage with pale blue lower surfaces. An alternate standard color is dark green upper surfaces with pale blue under. Cross style is per drawing.

There is no scale rigging since the original is built as a cantilever wing structure, and I assure you that the model is quite stout.

The wings are tough to build, but the rest is easy. The wings arc straight on top but with tapered thickness. The front spar is simple and straight on top, but the rear spar is not straight on top because the airfoil shape gets thinner toward the trailing edge. One other thing before we get into details ... the airfoil is semi-scale, with the center flat with increasing undercamber to the tip.

I don't know what you would get it you tried to make it semi-symmetrical.
A flat-bottom airfoil would work O.K.

Close-up of fuselage reveals engine mounting. Guns are mounted on a removable hatch which gives access to the radio gear. All such stuff has to be well forward in this short-nosed design.



A Super Tiger 40 with an 1 1-4 prop provides the power. The cowl, even though it is 7 inches in diameter, does not appear to interfere with the propeller effectiveness, nor with cooling.

et's get into the construction, starting with the cowl. Once this is done, you can match the body construction to it . . . rather than the other way around. Carve the cowl shape from a foam block and seal with Sears ready-to-use spackling paste . . . sand, and then wax. Obtain an eight or nine inch plastic bowl and mix a slurpy batch of plaster-of-Paris therein. Force the carving into the mix and weight it in place until set up. The carving will come out easily. Fill in any holes with spackling paste. Let dry and then surface with paste wax. Wipe the mold with liberglass liquid mold release and lay in three layers of open weave fiberglass glass, using polyester laminating resin. Use duckbill metal handshears to trim the cowl to shape. *(A hardwood cowl could be turned on a lathe . . . you'll need the weight anyhow! wen)*

The body is next. Pin 3/16 sq. spruce longerons in place over the drawing. Pin and glue cut lengths of 3/16 sq. spruce or balsa uprights and bond in place. After this assembly dries, repeat for the opposite side. Now make the forward bulkhead and notch for the longerons. The upper longeron is conveniently straight, so block the body sides, with forward bulkhead, over the drawing. Then pin and glue random cut lengths of 3/16 sq. balsa inside the longerons making a neat strong lap

This picture, taken in 1968 (!) is of the author's son, Clark, holding up the bones of the D-VI for display. Construction was kept light.

Author/designer Phil Foster (no relation to the Brooklyn accented comedian) shows the clean under side of the D-VI. Uses .40 engine.

joint. This technique makes for fast, enjoyable building. If you use five minute epoxy, you can make the frame in a couple of hours. Add the 1/8 in. balsa firewall formers, which should be 1/16 less than the cowl diameter to allow for the forward body sheeting.

The landing gear is next so it can be bound into position prior to adding more work. It features scale operation, but the stroke of the axle on landing is not contained within the landing gear wing as on the real airplane. It can be contained by tightening up on the shock cords. I left the landing gear wing open on the top for my model. The landing gear wing is removable and is held in place by two inward turned wire pins which arc also the anchors for the shock chords. The landing gear is bound onto the spruce across members with heavy thread. Cross brace wires are used on the real airplane.

In order to bring the model along uniformly, we should start the tail group which, when attached, will help the eye keep things true ... so let's get it framed next. Cut the outline of the rudder from a piece of corrugated cardboard. Cut the outline 3/16 inch undersize to allow for the balsa laminations. Make six strips of 1/32 sheet about I/4 in. wide. Pin the reduced rudder outline on Titebond to the balsa strips ... then stack them. Starling at the bottom of the rudder, pin and wrap the wet laminations around the whole rudder outline. The rest of the rudder frame is quite conventional.

The horizontal stabilizer is scale area and of conventional construction. Select light wood, minimize the glue, and keep the tail light. The stabilizer leading edge radius is to be kept as large as possible since the wing leading edge radii are large and we don't want the tail to stall before the wings do, even though, like any high sweep leading edge, the horizontal will hang on through large angles without stall. *(O.K. aerodynamicists, any comment? wen)*

The lower wing should be stalled next, since it is good practice for the upper wing. Make a root and a tip airfoil template. Cut twenty-four pieces of l/l 6 sheet medium balsa of sufficient size for ribs. Stack and pin twelve pieces together and then align. Pin the templates at opposite ends of the stack. Carve and sand the stack and notch carefully. Repeat for the other twelve ribs. Splice 3/16 sq. balsa spars and arrange over the drawing. Block up tips and pin securely. Attach ribs, using Titebond, since this dries slowly enough to make adjustments. Insert the upper forward spar, which is perfectly straight. Let this assembly dry while preparing the upper rear spar, which is also straight (see side view of the drawing).

Glue on the upper rear spar. The wing is still very flexible, so make any alignment changes in the jig at this time.

(Note: When the vertical grain 1/16 balsa shear webs are glued in, the wing will become quite stiff). Cut and glue them in very carefully. Do not leave these out, as they make the upper and lower spar members work as a single deep beam, producing a very rigid wing assembly.

Now add the trailing edge and the leading edge sheeting with the wing off of the board. The false leading edge member makes the leading edge sheeting easy. Next, add the leading edge, and finally, the tips and the cap strips. The interplane strut sockets can now be glued in and sanded flush with the upper surface

Let's turn to the body again and mount the cowl to the firewall with blocks, as indicated. Now check the firewall to see if it is 1/16 inch below the cowl contour. This relief will allow for the sheeting of the body back to the cockpit. Cut the longitudinal tapered former from 3/16 medium balsa and glue into place. Now glue in the wing cabane strut anchor blocks. Do not sheet yet since we have to attach the wire inboard cabane tripod legs to the upper longerons.

This cabane system is very simple and strong. It is also collapsible. (See illustration). The pair of inboard legs arc of a simple triangular form but should be made very close to the same length since the wing is positioned by them. The long forward leg is made in two pieces, allowing them to be soldered to exact length upon installation. The rear cabane members are also soldered to exact length in the same fashion.

The upper wing is next. It follows the same construction sequence as did the lower wing; i.e. cut templates and rib materials, slack, shape, notch and mount on blocked up spliced balsa lower spars. New items in this structure are the dihedral upper rear spar, ailerons, and the cabane fastenings. I recommend that all spars have the dihedral spliced in. Aileron size, control horn location and hinge line arc scale, but the horns are standard Goldberg. The cabane fastenings are screw-mounted Midwest aileron cranks. The location of the aileron servo is now determined and this will in turn determine the aileron pushrod arrangement at the wing center section. The section view of the wing at the aileron shows the inclined crank installation. The crank, mounting block, and rod details are an individual choice.

My model had the servo in the fuselage with a link to a crank arm in the wing. The real airplane has a single cable aileron control system coming from the control stick, through the side of the body and entering the upper wing at the rear cabane attachments. If the servo is placed in the wing, the wires could be enclosed in a soda straw, thus keeping the installation neat.

Access to the innards is through the hatch in the body just under the top wing and through the lower wing cut out.

The Williams Bros. Spandau machine guns are attached to the hatch and thus are out of the way as you work in this area.

The lower wing is positioned by a key system and internal rubber bands pull the wing forward and up. This internal rubber band trick is also used for the horizontal tail attachment.

With all the cabane fastenings, hatch mounts, and flying surface structures completed, we can finish the body. The cockpit, turtle deck, and the side fairings can be completed. Don't forget to build up the body frames out to the fabric surface with soft balsa. This is advisable for stiffening the body in torsion when covered, and aids in handling the model. In my model I tied the upper longerons together in the cockpit area with sheet balsa. The drawing shows double longerons.

A list of the several things yet to be done is useful at this stage and such a list follows engine installation, basic weights location, cabane strut assembly installation, control rods, interplane struts, covering and finishing.

The engine is oriented for serviceability and for cooling. It would have been better to be upright in order to raise the engine weight. Any mount you choose will be fine. I made my own from a piece of 5/8 in. thick birch shelving, with down thrust of two degrees built in. Wood screws are used to attach both engine and mount in place.

Now a word about weights location. When a model rolls, it will do so about an axis determined by the weights of various elements of the model. These include wing(s), servos, fuel, battery, tail group, wheels, and engine. For inherently stable flight, the axis of this distribution should be higher at the nose than at the after part of the model. The effect is to slightly yaw the model to the side of the low wing which increases the lift on the forward wing while the yawed vertical responds to return the model to the direction of flight. Pattern models don't want this stability . . . scale models mostly do. (Interesting theory . . . any comments readers?) The DVI gets this distribution by keeping the tail group, which is above the roll axis, very light and by placing internal weights high in front to counter the landing gear weight, which tends to lower the roll axis in front.

Skilled flyers may get by without considering stability as very important. The drawings show where I placed my weights.

Alignment of the cabane system and upper wing is a logical next step. Insert the inboard cabane into the wing fittings and prop up the wing, i.e., 'til the lower surface is parallel to the upper longeron.

From the longeron to the wing lower surface you should have three inches (plus or minus 1/16 in.).

Now solder the two-piece outboard forward cabane strut with both ends in their respective fastenings.

Do the same operation for the rear cabane. To remove wing, simply slide off the bent ends. I use a small rubber band looped between the front and rear wing fittings for retention. I had originally planned to use 1/16 Du-Bro collars at the forward fittings only, but failed to provide enough clearance. You can make a recess in the wing if you want a neater installation.

The intcrplane struts of the model carry no load. They arc made using one piece of 1/32 steel wire bent in an “N” and incorporating a spring loop at each end. The drawing shows the shape, but for drawing clarity the dihedral allowance is not shown. Measure and bend the wire. Make the wood fairing with 1/16 spruce, contour bind each end to the wire, bond, and cover with Silkspan. The balsa sockets in the wings must be flush to the covering to minimize tearing. The loop ends of the struts help in this regard.

The VVWI scale model fan has bene-fitted greatly since the advent of the Williams Bros, scale guns. All that is needed is directions as to how many, and where and how mounted. For the rear gun mount, a transverse 1/16 wire rod is attached to the underside of the hatch balsa skin with balsa blocks. The wire is bonded in place and when the bond sets, twist the wire and break it loose. The wire can now be pushed from side to side. The guns now drop into a cutout in the hatch and the wire rods slip through the mounting holes provided in the guns. The forward mount must be made of thin aluminum . . . bent into a “U” shape and drilled to match the plastic protrusions provided at the forward gun mounts. These brackets should be screw-mounted to a block bonded into the hatch.

At this point a thorough check of all flying surface alignment should be done. Use the body vertical centerline as a reference. This then makes the vertical sternpost on the centerline. The body upper longerons arc parallel to the body horizontal centerline. Measure to see that each wing tip is the same distance from the sternpost and that the root sections of the two wings arc parallel to the body upper longerons. The horizontal and vertical tail surfaces are checked in similar fashion. Any corrections to be made should be done before the covering is applied.

Covering is the most satisfying step of building any model. The shape becomes complete and the structure is firmed and you feel almost finished.

The model was covered with silk and clear butyrate doped prior to adding any color. Some new model covering fabrics could be used, such as Coverite, but they are heavy.

Plastic covering is out for the scale fan, but Monokote can be dulled by spray painting ... I recommend silk.

Color selection affects the model appearance more than any other single item. I wanted to do a hexagon camouflage job and found it fairly easy to do. My only regret is that the camouflage works too well. The lines of the model are broken up when viewed against almost any background . . . this is a difficulty when taking color photos. The underside of the model is pale blue and views from below show off the lines very well. If I refinish the model, I intend to use dark green upper surfaces, similar to the contemporary over-painted Fokker DVI 11, pale blue lower surfaces, and white rudder. All crosses have a white outline.

For those who wish to finish in hexagon, the following ideas are suggested. The size is as depicted and the colors are best taken from the “Munson Pocket Encyclopedia 1914-1919”. There are patterns of cither four or five colors. Work out a pattern, noting that most figures are six-sided with an occasional five-sided figure. Make a template of about five of the figures and then practice laying out your pattern using the template. When you can get a surface to look like the pattern has been machine printed on material, then you are ready to do the model. The pattern is applied to the airplane in a regular fashion since the printed fabric was applied with the warp of the cloth spanwise. The first color coat should be of the lightest of the chosen colors. The subsequent colors are applied with a small brush held in a steady hand. Don’t rush it. It took about twenty hours to put the pattern on the model.

The crosses are hand-painted on. I like the narrow crosses shown, although the real aircraft had narrow or broad crosses shown in my photos of the actual craft.

Flying is best done in the calm of the day with the customary taxi tests preceding, in order to try throttle, rudder and tail attitude while still on the ground.

The model, built in Seattle, was first flown December 1968 at Langley Field, Virginia by my good friend, Tom Strom. The day was cold and windy but other circumstances decreed that flight take place. The third flight that day was made downwind (not by choice) and into the rough, with very minor damage.

The model is now here in Seattle, and is still complete, but it has only been flown about ten times.

It does fly well and it is a smart looking ship with the added features of being unusual plus being an active combat craft of World War I.