Sopwith Pup

Four years ago when I first read about the Quadra powered big ones, I became enchanted with mammoth scale. Then three years ago I decided to build a 28% Stand-Off Scale Sopwith Pup. It's 28% size because that's the largest Pup I can fit fully rigged into my Chevy Suburban.

Since my motto is, "I steal only the best," (ideas that is), I spoke with the experts in my area. Men like Granger and Larry Williams were especially helpful during the design stage. Bruce Reynolds, the archivist for the San Diego Aero-Space Museum, provided me with three-views of the Pup shortly before the museum was burned. (A new museum opened in June 1980).

I used an opaque projector to enlarge the plans onto 3' wide paper obtained from

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Joseph Bukovchic, author, designer and builder of the Sopwith Pup, How's this for mammoth scale?

About The Author

Joesph Bukovchik is 42 years old, married, and has four daughters ages 6, 8, 10 and 12. He's a social worker, working with abused children for San Diego County. He lives in Vista, California, home of Kraft Systems. He's been a model builder since kindergarten some 37 years ago. Joe's next project is going to be a 1/2 scale Van's RV-3 and his wife doesn't know about it yet until she reads it in RCM.

SOPWITH PUP

Designed By: Joseph Bukovchik

TYPE AIRCRAFT
1/2A Sport Scale
(28% of Orig. size)
WINGSPAN
89¾ Inches (both wings)
WING CHORD
18 Inches
TOTAL WING AREA
3200 Sq. In.
WING LOCATION
Biplane
AIRFOIL
Semi-semmytrical
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
1½ Inches (both wings)
O.A. FUSELAGE LENGTH
57 Inches
RADIO COMPARTMENT AREA
(L)15½" x (W)5½" x (H)8"
STABILIZER SPAN
34¼ Inches
STABILIZER CHORD (incl. elev.)
13¾ Inches
STABILIZER AREA
460 Square Inches
STAB AIRFOIL SECTION
Flat

A potpourri of Sopwith Pup photos including (above) Eileen O'Malley with George Stokers' 1929 Model A convertible. The "Ace" at the controls on the opposite page gives an idea of the size of the aircraft.

This magnificent "Pup" is a challenging project for the dedicated modeler but the reward is well worth the time and effort to construct it.
By Joseph Bukovchik

STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
11½ Inches
VERTICAL FIN WIDTH (incl. rudder)
15¼ Inches (Max.)
REC. ENGINE SIZE
1.9-2.6 cu. In.
FUEL TANK SIZE
16 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Elev., Ail., Throt. Rud.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Spruce, Ply
Wing	Spruce, Ply., Balsa
Empennage	Spruce, Ply., Balsa
Wt. Ready To Fly	**446 Oz.**
Wing Loading	**19.5-20 Oz/Sq. Ft.**

school, and then made a few design changes. The nose has been lengthened about 2½" to provide for better balance. All control surfaces have been increased 5%. Wheels are 6½" William's Bros. Golden Age wheels and not the Vintage type. I think the thicker rubber tire on the Golden Age type is able to handle a 28 pound plane better than its thinner counterpart. Total cost for the Pup was about $200 minus radio and engine.

The Pup is a project for someone who can spend a lot of time buying materials, cutting, fitting, sanding, gluing, painting, rigging and fine tuning this bird or, more appropriately, birddog. However, much of the work has already been done now that you have the plans. Mine weighs a shade under 28 pounds, but with 23 sq. feet of lifting area, the wing loading is 19½ oz. per sq. foot. With its thick wing and resultant displacement effect, its effective wing loading is considerably greater in lifting capacity then that figure provides.

To begin with, I found out a lot about wood, spruce in particular. The reason why spruce is the best for our use is because it has the greatest strength of any wood for its weight. It refuses to crack like pine and, when cut into thin strips and wetted down, you can literally tie it in knots before it caves in. Since spruce is expensive at the hobby shop, I bought a 1' x 8" x 15' board of straight grained Sitka spruce from a hardwood company. I cut it in half and took it home in my VW. I cut all the spruce with a new plywood blade on a 10" radial arm saw. Results were excellent.

CONSTRUCTION

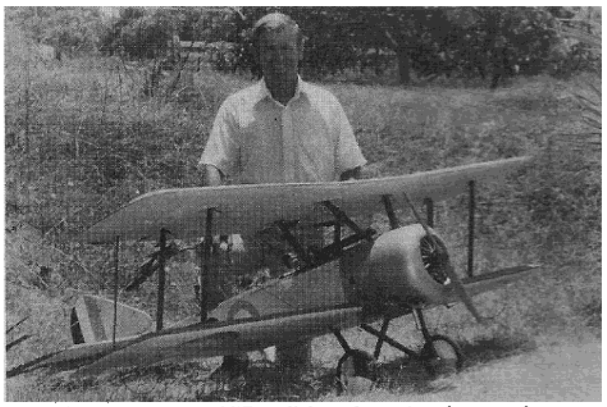
Rudder:

I began here because it's the easiest, simplest and instantly satisfying piece of construction. Besides, it provides good practice bending and laminating the spruce.

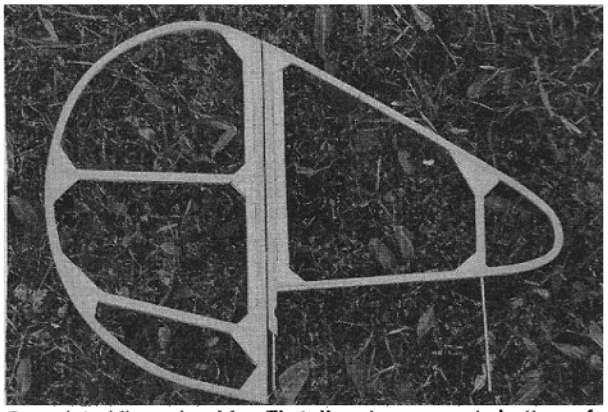
I used a piece of sound insulation board as my building board, placed waxpaper over the plans and drove 1½" finish nails into the board to act as guides for bending the spruce. I began with the inner piece and worked outward. After cutting the strips and wetting them down until dripping wet, I applied Titebond to both sides of each strip. Since the wood is so pliable, all laminations were in place at one time so that the whole mass could dry together. Lots of clamps and clothespins were used. It dries slow enough to give you plenty of working time to achieve fine results. Make the entire rudder outline as one piece. Thus, your strips to be laminated are about 42" long.

When the cross pieces and gussets are added, sand the rudder with a belt sander. A final hand sanding will make your results superior to anything you've done before. Try it, you'll like it. It's most authentic and antique looking.

After sanding it, cut through the hinge line with a razor saw. Obviously you have a perfect match. When some of my fellow Palomar R.C. Flyers saw the finished project, they thought it would be difficult to laminate, but it is an easy and effective

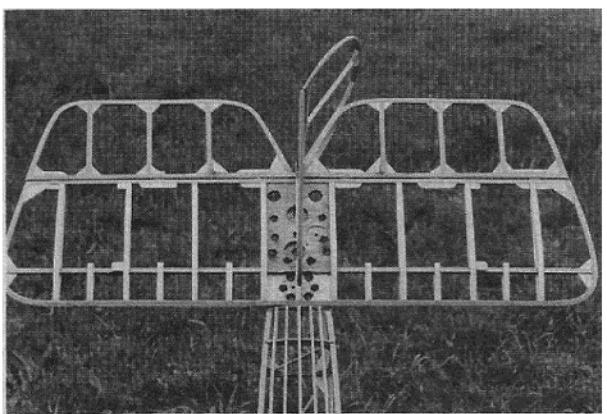


Joe and his completed "Pup." A real masterpiece and super flying machine.

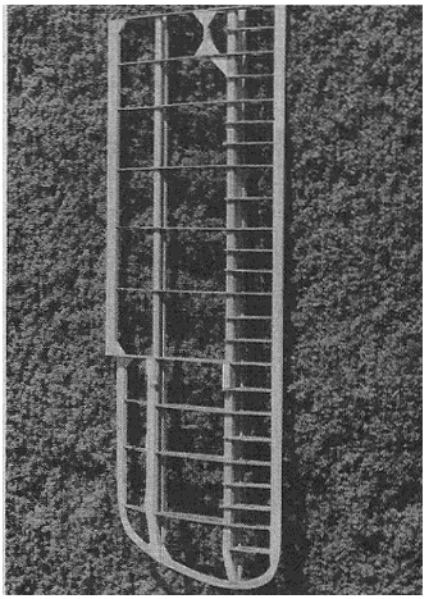


Completed fin and rudder. Fin tailpost now runs to bottom of fuselage.

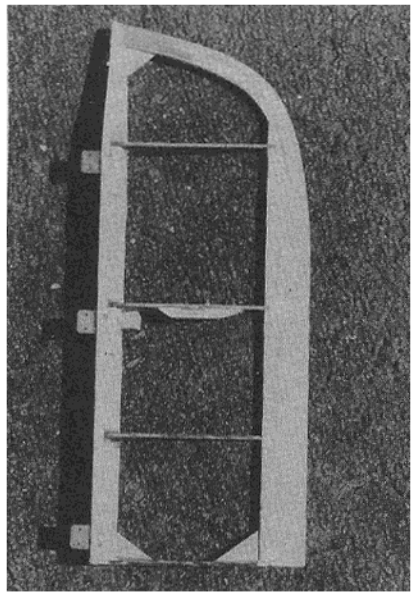
Pup is about to lift-off for another mission.



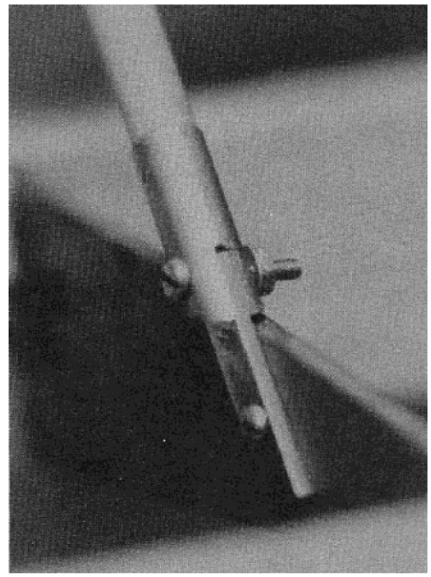
Completed stab and elevator. Framework is outlined with laminated strips.



Lower wing panel completed. Wing tips are also laminated strips.



Close-up of aileron. Note the hinges are secured by small dowels.



Adjustable aileron pushrod detail. See text.

method of construction.

Stabilizer:

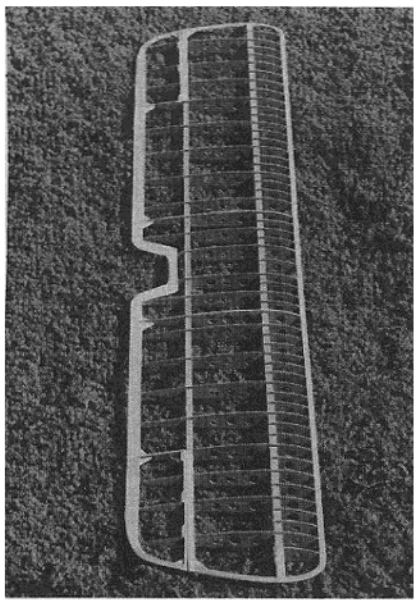
The stabilizer is begun the same way as the rudder, i.e., as a one piece laminated configuration. You build the leading and trailing edges with the tips as one unit. Thus, your strips are about 84'' long. Next add the ribs, capstrips, gussets and plywood for mounting. Build it with epoxy. I used my belt sander again and finished with some final hand sanding. When done, separate the elevator from the stabilizer by cutting through the laminated ends on the hinge line.

Cowl:

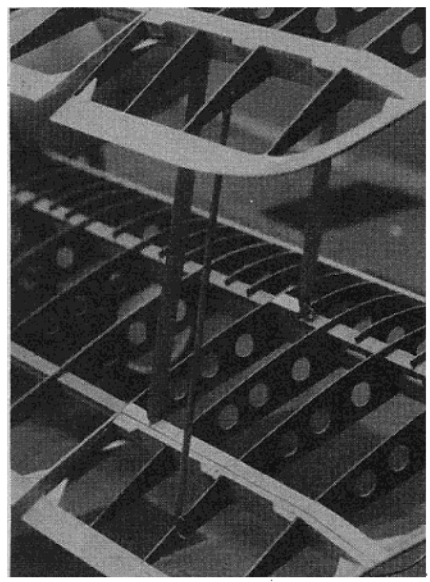
I spun a male cowl blank on a lathe. I glued 4 x 4 redwood posts together and the results were satisfactory. Next I made a female mold, making it in two halves. Doing it this way made it easier to extricate it from the wood plug. Further, I took some bailing wire and embedded it in the wet plaster to reinforce it. This helped to strenghthen that big mold.

After applying mold release to the inside of the plaster mold, I began laying up the fiberglass cloth. Since weight is no object up front, you don't have to worry about getting the cowl too heavy. I applied two layers of the heaviest fiberglass cloth I could find, laying it up in 2'' strips up the sides. Then, for the second layer, I wrapped it around the inside circumference. The finished product was somewhat pock-marked with air bubbles, but micro-balloons and filler took care of it.

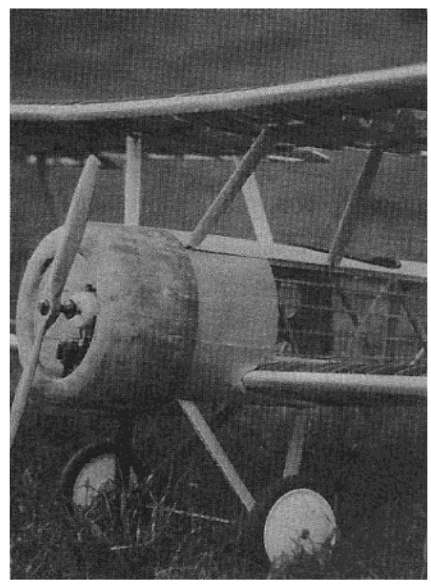
To mount the cowl to the firewall, I glassed a 1/8'' ply backplate to the rear of the cowl, then bolted through this plate onto



Top wing completed and sanded for final assembly.

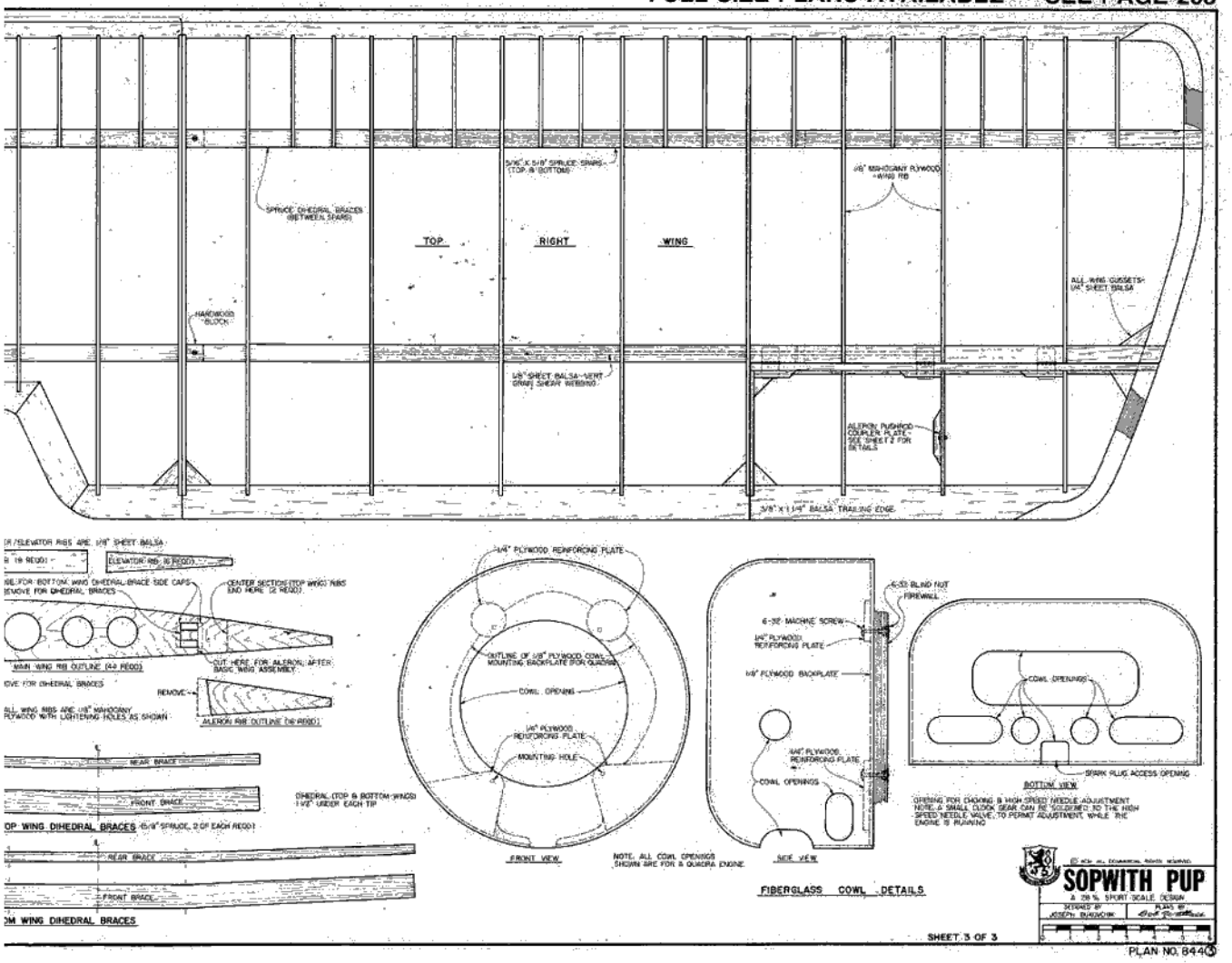


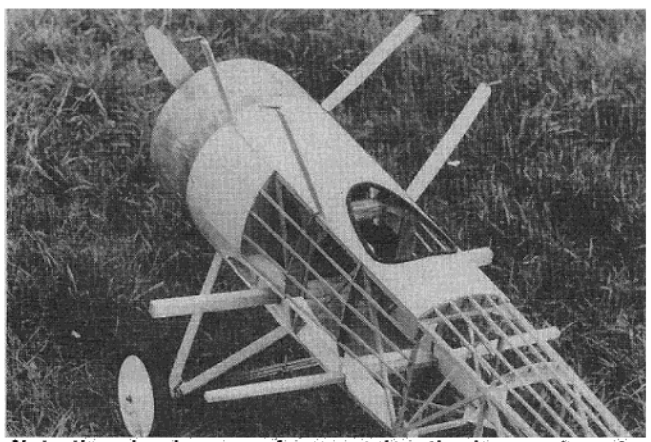
Strut attachment and aileron pushrod tie between wings.



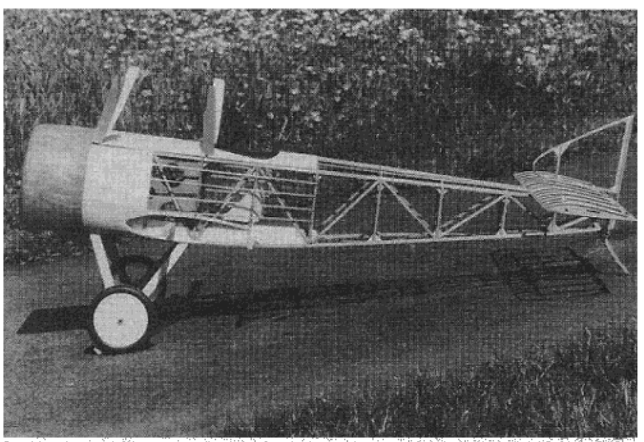
Fiberglass cowl makes the completed nose section just like the full-size one.

FULL SIZE PLANS AVAILABLE — SEE PAGE 203





Note the plug-in spars for removing the lower wings for transporting aircraft.



Completed fuselage ready for covering. This is when things get exciting.

the firewall. I used blind nuts to make its removal simple. However, since the cowl is removed many times during construction, I found it easier to mount and unmount the cowl with several machine screws.

Fuselage:

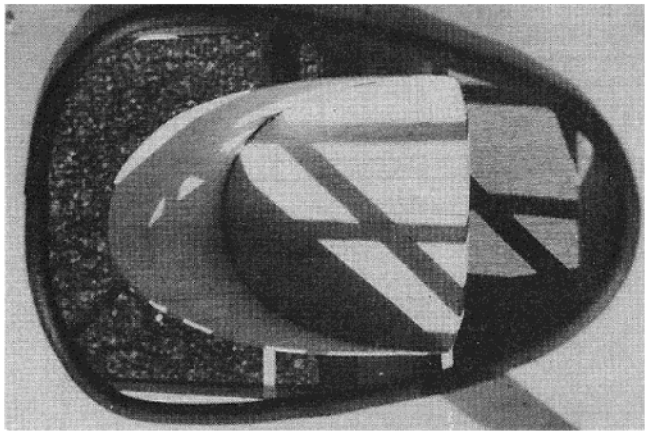
The body is regular stick construction that we are used to. I framed the sides, one over the other, joined them, added the cross pieces, and added the plywood floor and sides up front. Next came the landing gear and cabane blocks with plenty of gussets. The wires were already inset into these blocks. The entire body is glued with epoxy. This is especially necessary at the tail since there is a lot of vibration there. All the wires are wrapped with fiberglass cloth before gluing them into the body.

Landing Gear:

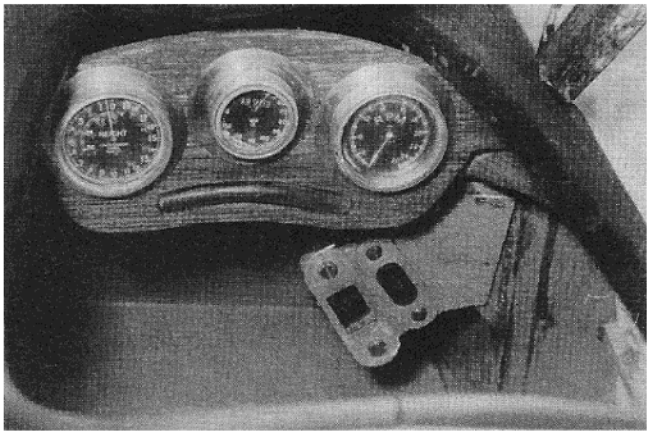
I used 7/32" spring steel wire for cabanes and landing gear. Where the pieces were wrapped with copper wire, they were soldered with a propane torch. I might add that a torch is a must. The landing gear cushions in two ways. One is through the bungee cord; the other is through the rubber on the wheel. You need all the cushioning you can get with such a primitive gear.

Cabanes:

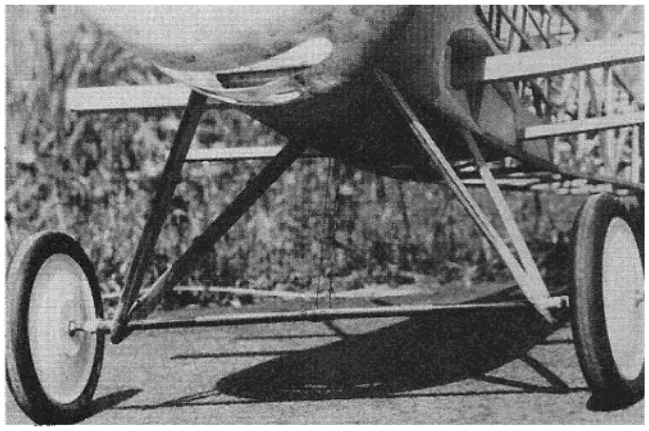
I used the torch on the ends of the cabane



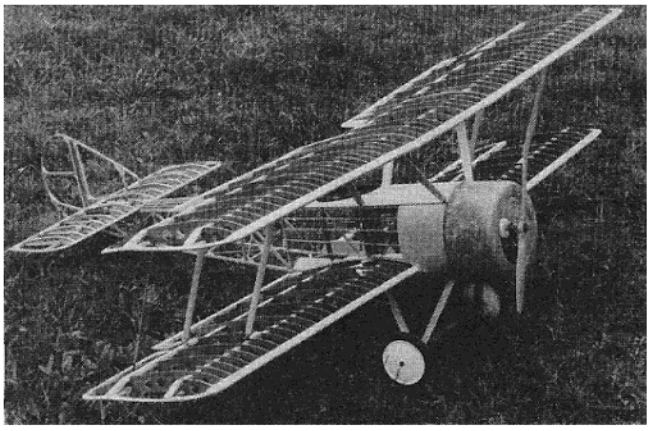
Looking into the cockpit showing pilot seat. This kind of detail adds much to completed model.



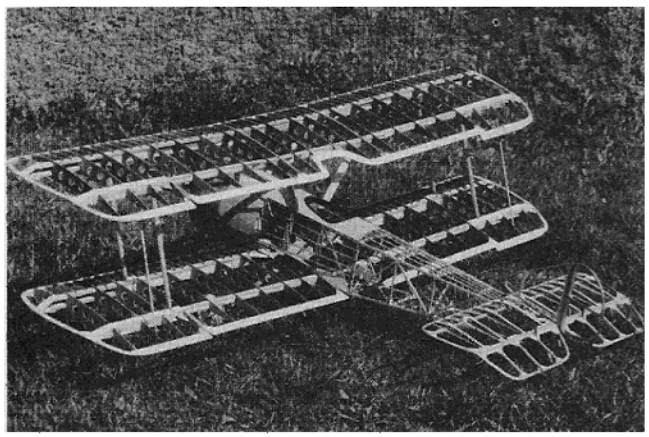
Instrument panel looks like the real thing. Note switch & charging plug located on panel.



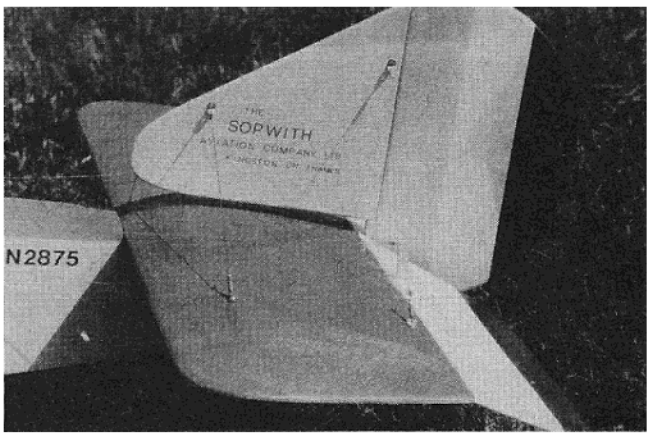
Close-up of landing gear detail. Good view of plug-ins for lower wings.



Three-quarter front view of framed up "Pup". Looks too good to cover with fabric.



Three-quarter rear view of "Pup." Photo shows prototype with symmetrical stab. Was later changed to a flat stab for better performance.



Fin lettering is made up from Zip-A-Tone Folio Light No's 16, 20 and 36 point. Fuselage numbers are Helvetica Medium 48 point (1/2").

wires where they bolt to the wings. Why? Heat made it easy to pound them flat so that I could bolt directly through them to the wing. It's a neat installation.

The hatch is removable which then allows for access to the inside of the fuselage. Further, since the hatch is covered with a 1/32" ply skin, it flexes easily when being installed. There is nothing difficult about the body except matching the cowl to the body. I had to use vinyl filler to achieve a perfect fit.

Not shown on the plans are the internal cross braces which travel from the top of one side of the fuselage to the bottom of the other. These are 3/16" sq. spruce.

The tail skid is a spruce, brass tipped affair. I used some waist band material from my wife's sewing kit to provide the rubber or spring type action.

Wings:

I began by making all the laminated wing tips first. Here I suggest you use a plywood building board so that the nails will stay in place for all four tips. Since you have become adept at laminating, these are quite easy since they are so small when compared with the tail feathers. A belt sander is a must for these tips. Sand them now. A Ritz #2-30-12 non-scale airfoil was chosen because I didn't want this Pup to fly like a kite. This deviation from scale enhances its flight characteristics by making for better penetration and firmer control. The ribs were made from inexpensive 1/8" mahogany door skin with appropriate

lightening holes. The leading and trailing edges are notched, ribs are slipped onto the spars, ribs are fitted to the leading and trailing edges and then glued. When adding the tips, I added a spruce strip to the inside of the tip at the leading and trailing edges. I overlapped these to secure the tip to the wing. Now, the finished aircraft can be picked up at the tips!

The bottom wings plug into the fuselage. Even though I don't need to dismantle the Pup for flying, it's still a good idea to provide for plug-ins. A crash or a long trip to Las Vegas would be reason to dismantle it. I wonder which will come first.

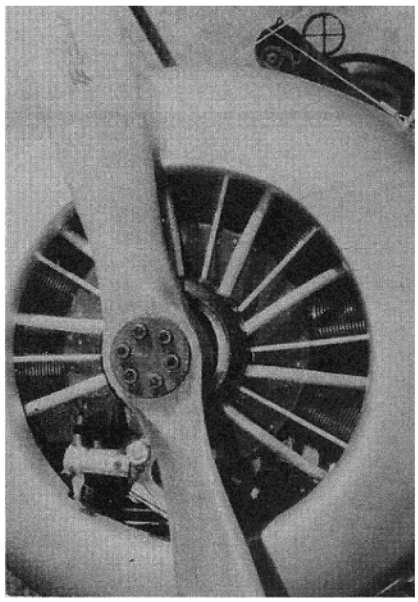
The aileron servos are installed in the bottom wings at the appropriate places. I had Kraft fabricate aileron connecting wires to enable this type of installation. Access hatches to these servos are in the bottom of the wings. These are not shown on the plans. I used Goldberg horns on the ailerons by screwing them into a hardwood mount. I have very little down aileron, but a lot of up.

As for the pushrod between the two ailerons, I used a straight 1/4" dowel. What is not shown on the plans it that I've made them adjustable. To achieve this, I cut the dowel to the proper length, minus about 1/8". Then I cut off 3/4" and fitted the brass tube over the end of the long piece. The 3/4" piece is going to slide inside this tube to provide for the adjustment. Epoxy a 4-40 1" threaded rod into the 3/4" end so that about 5/8" of the rod sticks out. Tap a hole into the dowel where the brass tube is located. Now you can thread the 3/4" rod into it and it's adjustable.

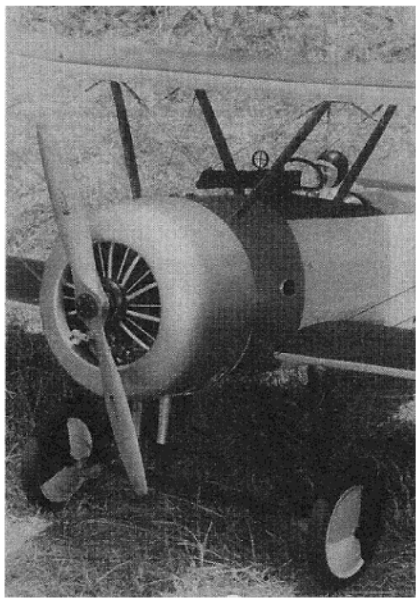
To mount the wing tip skids, I heated up the wire ends with the torch and bent them neatly to a small circle for use as a mounting base. Next solder a washer as a mounting plate and 4-40 it to blind nuts through the lower spars. Recess these ends into the hardwood pad you've epoxied onto the lower spar at that point. Obviously, you mount the skids when the plane is covered and painted.

Engine:

I had Dario Brisighella counterbalance the flywheel on the Quadra to cut down vibration. After installing a six bolt prop adapter, balancing the prop, attaching an E.W.H. throttle adapter and having Bob Wisniewski braze exhaust stacks to the muffler to direct the exhaust out of the cowl, I mounted the engine with my own mount. I used 10¢ rubber washers between the bolt head and the mount, between the mount and the firewall, and between the nut and the firewall. That means 12 rubber washers. I now have a workable Quadra that is quite satisfactory. A 16 oz. tank is more than sufficient for my needs, though a 32 oz. tank would be swallowed by the Pup. I fly it with an 18/6 prop.



William Bros. 3" Gnome cylinders hide most of the engine inside the cowl.



Looks very much like the "Pup" is ready to go into action.

A final word about the landing gear. It should be trussed in the center and with the criss-cross diagonals from the hardwood block inside the bottom of the fuselage. I've increased the width of the landing gear so that it'll have better ground handling. However, it's hard to tell the 3" difference from the scale plans. It still looks like a small track.

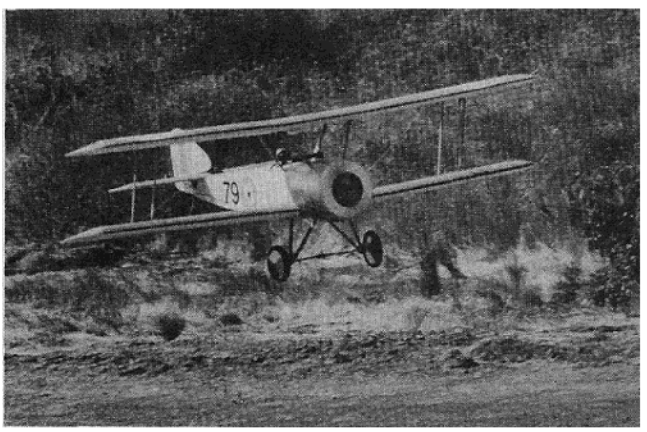
Covering:

It cost $40 for the Super Coverite and Balsarite. I pulled the Coverite very tight and have a smooth skin on the Pup. Next, Hobbypoxy clear (I used 4 cans) was sprayed and lightly sanded with #400 paper. A hint about the joints where Coverite meets Coverite on the top wing is helpful. To seal over these seams, cut a 1" strip with pinking shears, (very sharp pinking shears). Then lower the heat on your iron — I used my MonoKote iron. As an added protection against frayed ends, I put a piece of thin white paper over the strip and heated through it. Thus, the pinking edge was sharp and clear. I used five rolls of Super Coverite and then bought a 47" x 48" piece to cover the top of the bottom wings. The bottom of the bottom wings are pieced and you can hardly tell.

Color Scheme:

I used Formula U paints throughout except for the silver cowl area. Here I used Aerogloss Silvaire aluminum. To prepare the cowl, I sprayed it with Aerogloss balsa filler coat. The 6" area directly behind the cowl is also aluminum so, to prepare for a super smooth finish, I applied two coats of Aerogloss clear, doped in a layer of silkspan, added three more coats of clear, sprayed it several times with balsa fillercoat, sanded and sprayed the Silvaire aluminum 3 or 4 times. The last coat is compounded and polished to a rich luster. The finished product was worth all the effort because you'd bet it was aluminum for sure.

All upper surfaces are olive drab; that is, the tops of the wings and the body from the



end of the hatch back to the stabilizer which is also olive drab. The sides of the body and underneath portion of the wings, body and stabilizer are cream. To get the right shade, I mixed yellow and orange in very small amounts to flat white. By the way, all colors are flat. If you can't find flat colors, flatten them yourself by adding a little talcum powder. It won't change the color, but it will flatten the finish. The sides of the front part of the rudder are also cream. Blue, red, and white stripes are painted to the top and bottom of the elevator as well as to the movable part of the rudder. The wheels are painted red, white and blue as can be seen from the photos. When the 17'' diameter roundels are painted on, it makes for a classical looking Pup. All wood is stained a light fruitwood like the Pup of the Shuttleworth collection, and was then clear doped. Letters on the rudder and body are the rub-on type and a flat lacquer spray to set them. Just like on the full scale Pup, the roundels are hand painted.

Controls:

I ran the control cables (45 lb. test steelon leader) from the rudder and elevator to two 3'' bellcranks which pivot on a 1/8'' wire axle. The axle runs from side to side and is positioned in the area behind and below the pilot's seat. That way, you can install a functional control stick if you desire. Use crimp sleeves to fasten the cables to the horns and bellcrank. Tackle shops have what you need. The cables do not have to be drum tight; in fact, they are better with a little slack. This is not a pattern ship but a lazy, Sunday flyer that is slow to respond and gentle.

Flying:

The Pup is much like any other big bipe in that it is a rudder machine. You must coordinate ailerons and rudder to slowly turn this big bird --- but what a turn! It is every bit as majestic in flight as it is on the ground. What a crowd pleaser! Even though construction is long and somewhat complex, flying the Pup is a breeze. It was described as one of the best, most classical planes of its period. I can agree with that completely. When you fly this model, all other activity seems to cease. It casts a spell out on the flight line. I would estimate that it takes-off at 25 mph, flies at 20 and lands as fast. When you see a giant like this nearly hovering in a breeze, you just stand in awe. I've been tempted to fly it with my Sopwith Pup (see the photo) but I'm afraid the SPCA would press charges for cruelty to Sopwith Pups! □

From RCModeler Aug. 1981