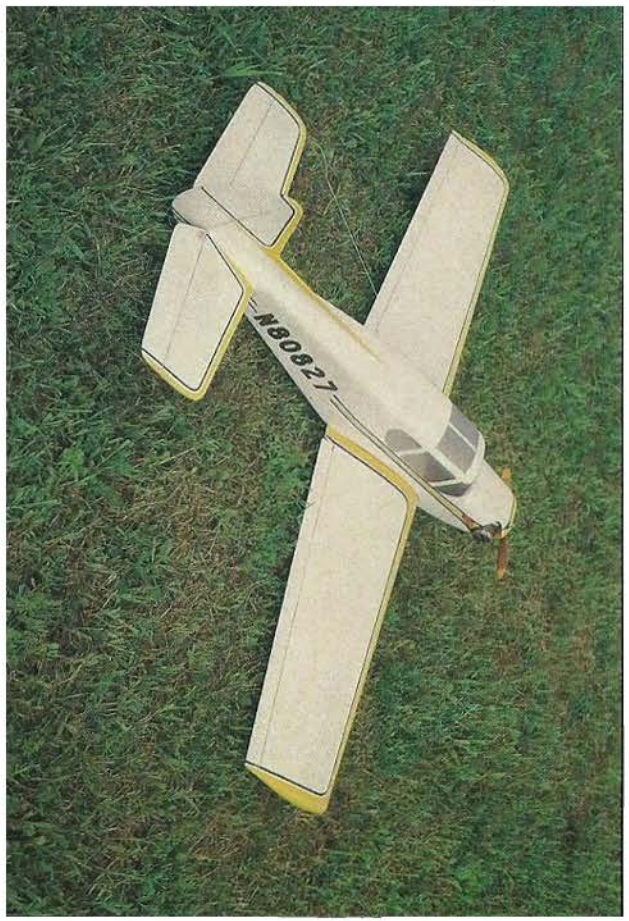
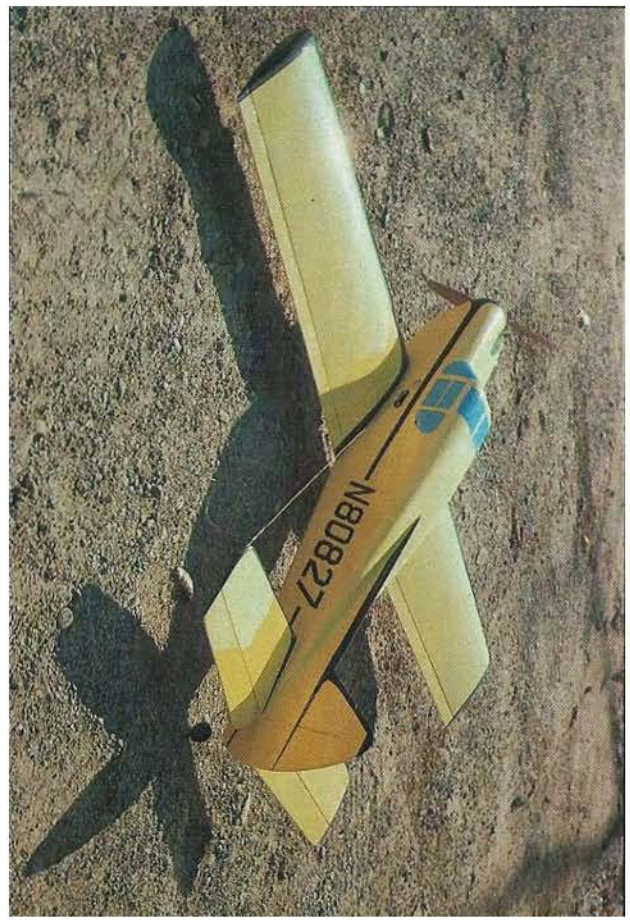
LI'L SWIFT

A forty-eight inch span all-purpose sport aircraft patterned after the Globe Swift. For .29 to .35 engines. The Li'l Swift will perform large, graceful loops, rolling maneuvers, multiple snaps, flat spins, Lomcevaks, and knife edge flight. BY DUANE GALL





● This model was conceived in the Fall of 1974, shortly after the untimely demise of my VK Cherokee Babe due to a fractured elevator linkage. Left only with fond memories and an OS .30, I began hunting for a replacement, something combining the scale-like appearance and good flying qualities of the Cherokee with originality and a little more spunk. A slightly shorter nose, a tapered wing with flatter dihedral, more rudder area below the stab for better spin control — these were some of the features I was looking for. I found these features and more in the 1946 Globe Swift.

The full size subject for this design is actually a modified Swift which appeared on the cover of the June 1972 *Air Progress* magazine. It is owned by Mr. Steve Halpern of Woodmere, New York, and sports a turbocharged 250-hp engine in place of the standard 145-hp. Billed as the world's fastest Swift, N80827 was modified by John D'Arcy of Miami, who specializes in making Swifts swifter. The article by Budd Davisson included several pages of excellent color flight photos which showed the aircraft's lines and proportions from a variety of angles. This made the basic eyeballing of the design an easy task. Here was an ideal modeling subject: it was overpowered, just like a model; the squared-off wing tips and extra dorsal fin area would adapt well to model use; and the dihedraled stabilizer added a touch of class I couldn't resist.

The first prototype flew early the next spring. It proved to be a good flyer, but heavy, being burdened with a Toledo-style dope spit shine. (Just too much of a good thing, I guess.) Don't be alarmed by the past tense — it still exists down in the dank confines of my basement. The reason it's not flying is that I'm having gangs of fun with the second prototype, which is nearly a pound lighter and much more energetic.

The name, by the way, is a result, not of planning, but of having to call the bird **something** during all the sketching and hacking stages. It's pronounced Li'l Swift as in "When are you going to be done with that li'l Swift?" Not too original, maybe, but descriptive.

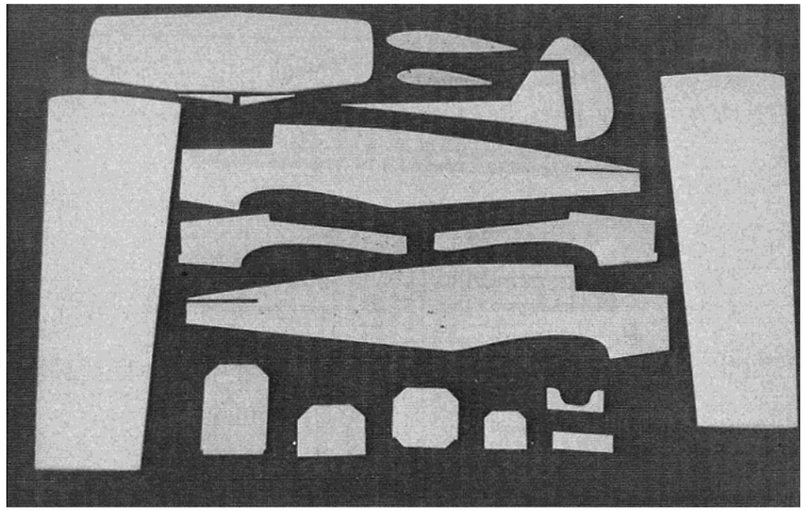
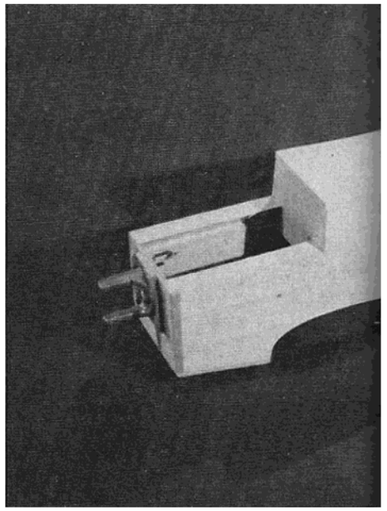
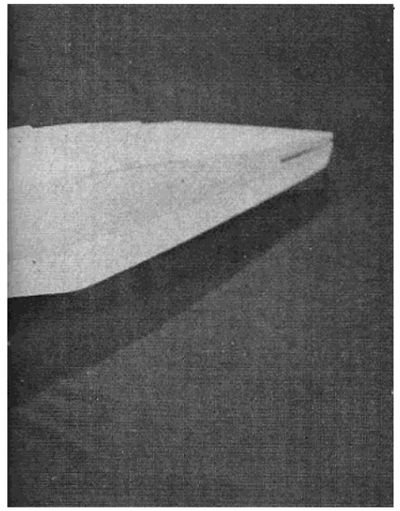
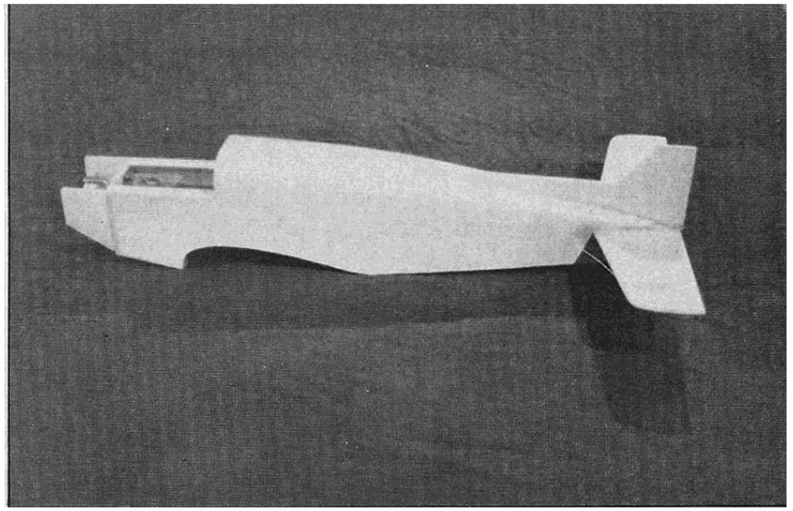
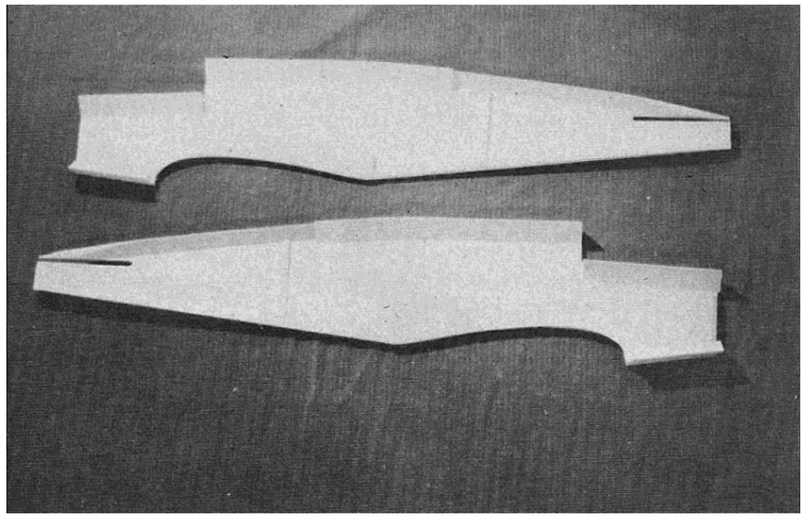
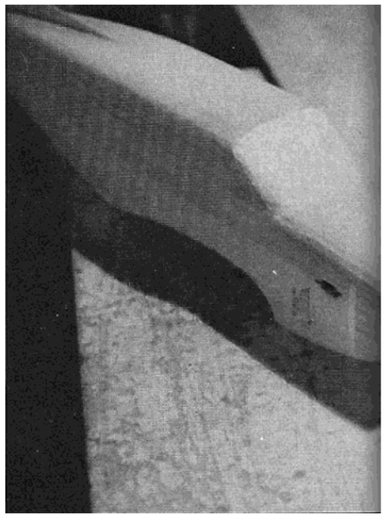
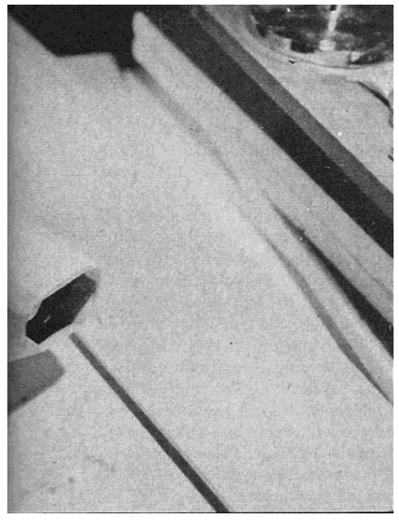
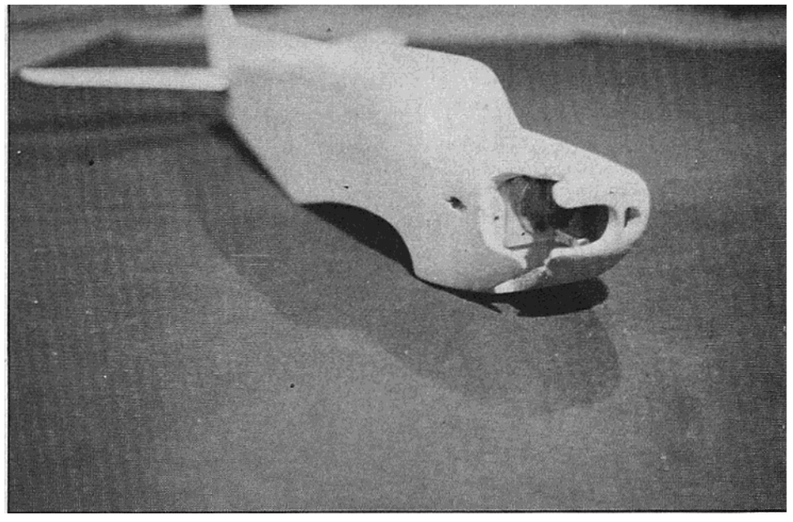
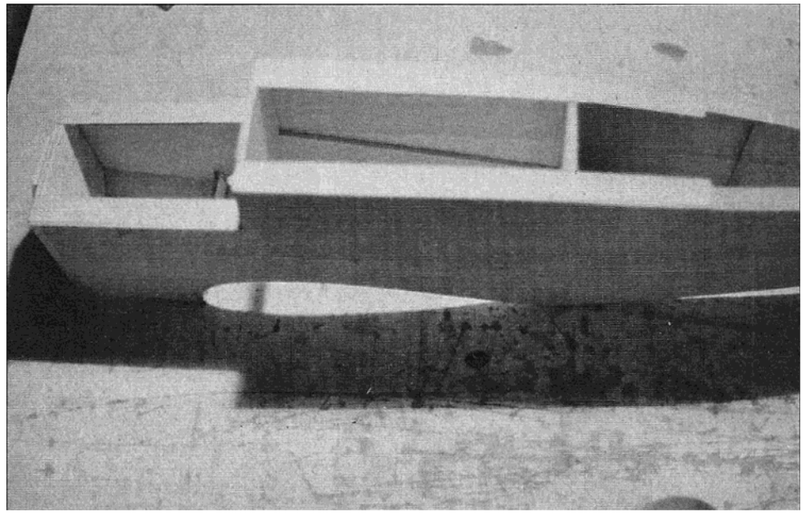
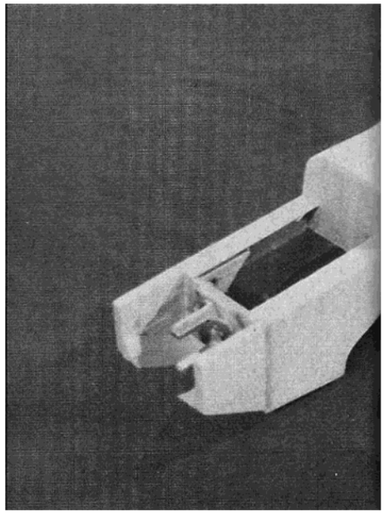
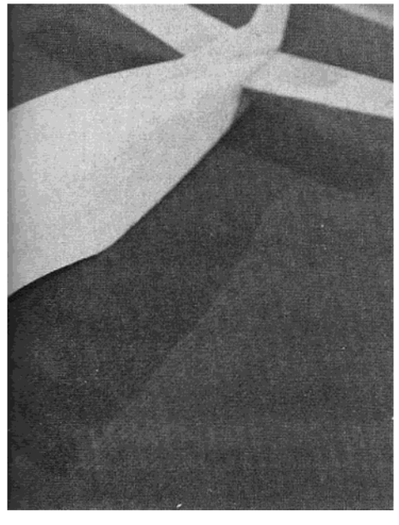
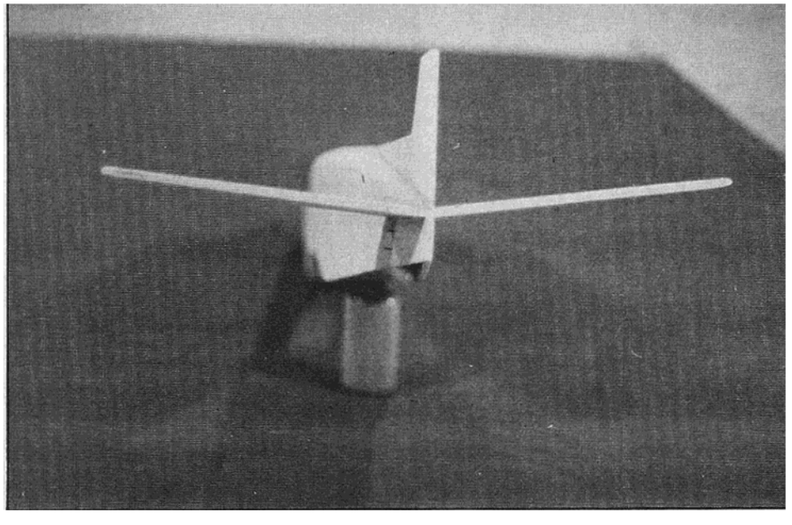
Both prototypes are stable and scale-like in the air, with good control response in all three axis. The short tail is evident in spin and snap maneuvers, and the strip ailerons are quite effective. The plans specify some approximate control throws for general sport flying. Do not exceed these throws unless you are an experienced flyer. This plane is not a trainer and will do anything in the book without much persuading. It is capable of large, graceful looping and rolling maneuvers as well as multiple snaps, flat spins, Lomcevaks and knife edge flight, all using the .30 for power. I've tried my best to fold a wing and haven't yet, but if you must use more that a .35, please add a dihedral brace. There's no sense pushing your luck!

Well, enough talk. It's time to start building. I'm assuming you're familiar with basic building procedures so I'll just briefly outline the construction sequence. The only special tools required are a good sanding block and a sharp carving knife with at least a 3" blade. By "a good sanding block" I mean a flat piece of hardwood about 6" x 4" or bigger with coarse sandpaper glued to it. Both these tools will make carving a lot easier. There's a considerable amount of carving on this plane and it may as well be done right.

Wing

The wing is of conventional foam and balsa construction. Cut two panels 23½" long, one left and one right. Glue on the 1/4" trailing edge and sand it down flush. Sheet both panels with 1/16" balsa using a good contact cement such as Sorghum which is compatible with the foam. The most economical cut of balsa for this is 1/16" x 6" x 48". Use three pieces and cut them in half to make six pieces 24" long. Have one piece wrap evenly around the leading edge of each panel. The remainder works out just right with only a small amount of extra wood required at the center section.

After both panels are sheeted, sand the ends flat and epoxy them together at the center with a dihedral angle of about 4°. A 1¼" block under each tip will give the right amount of dihedral. Before the glue sets make sure the panels line up properly, front to back, or otherwise you will have built a set of 10" wide ailerons! After the epoxy has cured, add the center trailing edge stock, the wing hold-down dowel, and the aileron control rods, and allow these to cure also. At this point decide whether or not you have a good solid center section. If so, you can save some weight by only fiberglassing a 4" square area at the trailing edge to

support the bolt holes and aileron linkages. (You may want to reinforce the seam by rubbing in Hobbypoxy II a quarter inch or so on each side.) Otherwise, wrap the whole center section with glass cloth as shown on the plans. I've built one each way and they're both plenty strong.

Add the 3/4" wing tip blocks and carve them to shape. The ailerons are made from 1" wide tapered or trailing edge stock. Trial fit the ailerons and hinges, making sure that they move freely and that the control rods do not bind.

The cutouts for the landing gear blocks and aileron servo are made by melting the foam with a soldering iron. Complete the wing by installing the landing gear blocks with lots of epoxy. I like the Gas Model Products 6-minute epoxy for this because of its stiff consistency which makes it fill gaps well. After covering the wing with your favorite finishing material, add the ailerons using Titebond on the hinges and epoxy on the control rods. Now set the finished wing someplace where you can see it, so as to make the fuselage construction go more quickly.

Fuselage

Begin by making two fuselage sides from 1/8" sheet balsa. Each side requires one full 3" x 36" sheet (bottom half) plus part of a 4" x 48" sheet (top half). In this way you can get two fuselage sides from three sheets of balsa instead of four. Neat, eh? Cut the doublers from 3/16" sheet and glue them to the fuselage sides. Again, make sure you have one right and one left. Add the triangular stock and the spruce braces, trimming where necessary to clear the bulkhead and stabilizer slots. If the triangular stock is reluctant to bend, soak it in water or make small saw cuts part way through as shown on the plans. Glue the spacer F1A to firewall F1 then glue all the bulkheads to one fuselage side. They should all be perpendicular except F4, which is angled slightly. Join the fuselage sides and clamp as necessary to keep them straight. When dry, trim the spruce and triangular stock at the tail and pull the tail together. Do this over the plan to check the alignment.

LI'L SWIFT
Designed By: Duane Gall

TYPE AIRCRAFT
General Sport
WINGSPAN
48¼ Inches
WING CHORD
Root 10" — Tip 7¼"
TOTAL WING AREA
420 Square Inches
WING LOCATION
Low Wing
AIRFOIL
17% Semi-Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, Each Tip
1⅜ Inches
O.A. FUSELAGE LENGTH
35¼ Inches
RADIO COMPARTMENT AREA
(L) 8" X (W) 3½" X (H) 4½"
STABILIZER SPAN
19 Inches
STABILIZER CHORD (incl. elev.)
5⅝ Inches (Avg.)
STABILIZER AREA
105 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
STABILIZER DIHEDRAL
1" (each tip)
VERTICAL FIN HEIGHT
8 Inches
VERTICAL FIN WIDTH (incl. rudder)
6¼ Inches (Max.)
REC. ENGINE SIZE
.29-.35 cu. in.
FUEL TANK SIZE
6 or 8 ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Four
CONTROL FUNCTIONS
Rudder, Elevator, Ailerons, Throttle
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Foam and Balsa
Empennage ..... Balsa
Weight Ready-To-Fly ..... 64 Ozs.
Wing Loading ..... 21 Oz./Sq. Ft.

Sheet the top aft portion of the fuselage with 1/8" balsa (crossgrain). Add also the 1/4" cabin top block and the 3/16" sheeting under the tank compartment. Drill the necessary holes in the firewall for your engine and tank installation. Fuelproof F1A and the back of the firewall with a light film of Hobbypoxy II. Bolt on the engine mount.

Now attach the 3/8" sheet front blocks, front end triangular stock, and 3/8" bottom block. Fuelproof inside the tank compartment with Hobbypoxy II. While the epoxy is still wet, coat the inside of the 1/4" sheet top block and epoxy it on. Start cutting out the tail surfaces while all this is drying.

The next step on the fuselage is to cut the windshield block to the right dimensions, hollow it out a bit, and glue it on. Now roll up your sleeves and grab that knife for about a half hour of carving. Rough in the forms of the cabin, rear deck, bottom front and side blocks, and cowl area. The only tricky spot is where the windshield meets the forward portion of the fuselage. Proceed carefully and use the visible seams to judge depth and curvature. Somewhere in here, after the cowl area begins to take shape, sand the front end flat and glue on the nose block. (This is so you can see inside to avoid carving away too much at first.) Carve the nose block to shape, final sand everything, and make the cutouts for the engine and muffler. Fuelproof the engine compartment with epoxy and you're ready to install the tail surfaces.

Trial fit the wing on the fuselage and slip the stabilizer into its slot. Eyeball things carefully to make sure that neither the wing nor the stab is tilted. You may have to sand the wing seat a bit. When everything looks good, glue on the stab and the vertical fin, cut the holes for the pushrods, (knock a hole in F4 while you're at it) and sheet the bottom with 1/8" balsa. Epoxy in the plywood wing hold-down plate and, using the wing as a guide, drill and tap for the 1/4-20 nylon bolts. Double the wing hold-down plate if you don't land so good! Now check everything one more time, sand lightly and cover.

An optional removable nose block is shown on the plans. The first prototype had it, and it worked, but I later abandoned it since it involved some "Mickey Mouse" and didn't improve the plane's appearance much. It's simpler to just cut away enough wood to allow the engine to drop in from the side. I leave it optional though, and if you want to use it, tack glue it on lightly during the carving stage so it will come off.

Tail Surfaces

The stabilizer is made from firm 1/4" sheet and is cut at the center for dihedral. After shaping the tips, make two saw cuts — one on top and one on the bottom — at the center line. Do not cut all the way through. Now crack it so that it bends up one inch per tip and fill the seam with epoxy.

Make the elevators from 2" wide tapered stock if you can get it, otherwise taper a piece of 1/4" sheet. In either case leave them together during the cutting and shaping stage so they're easier to hold onto. Cut them to the right outline, sand the tips to match the stabilizer tips, then separate them.

No tie bar is needed for the elevators, rather, each one has its own control horn. The elevator pushrod is made in the standard manner (1/4" dowel with wire Kwik-Link rods attached on each end with thread and epoxy), except that the aft end has two link rods instead of one; the pushrod is Y-shaped with adjustable links at each of its three points. In this way you can either trim each elevator individually or trim both at once by adjusting the single end. 'Nuff said?

The rudder and fin are nothing fancy. The top of the tailwheel strut is epoxied into the rudder for ground steering. Don't leave off the dorsal fin — the rudder has no bracing of its own and depends on the dorsal for support.

Flying

Make sure that the surfaces are all straight with no warps and that the controls all work the right way. Double check the balance point with the tank empty then gas 'er up. On takeoff, hold in about half up-elevator and just a tad of right rudder. Go easy on the rudder as it is sensitive. Trim flights should be made on a calm day, and make those first takeoffs "steady-as-she-goes" until you are familiar with the airplane.

For landing just cut back the power and hold in a little "up". The Swift glides well despite its high (19-25 oz.) wing loading and will not tip stall if balanced properly. You may find landings the most fun of all — I average about five touch-and-goes per flight.

Here's a fairly complete list of the raw materials you will need for this project. It includes everything I can think of besides pins, glue, engine and radio. The total cost of all this stuff is about $50.00 but you probably have a lot of it, such as wheels, wire, hinges, etc., sitting around the shop already. All items are balsa and/or in 36" lengths unless otherwise specified.

FUSELAGE AND TAIL:

2 1/8" x 3"
2 1/8" x 4" x 48"
1 1/8" x 1/4" x 48" spruce
2 3/16" x 4"
1 2½" x 2" x 6" block
1 3/16" x 6" x 12" ply
2 3/4▶ x 36"
2 1/2▶ x 36"
1 3/8" x 4" x 12"
1 1/4" x 4" x 48"
1 1/4" x 2" tapered balsa stock

WING:

4 square feet of foam
1 3/32" x 6" x 12" ply
3 1/6" x 6" x 48"
1 package aileron linkages
2 1/4" x 1" tapered balsa stock (T.E. stock)
2 slotted hardwood landing gear blocks 1/2" x 3/4" x 6"
2 hardwood L.G. anchor blocks 1/2" x 3/4" x 1⅛"
4 L.G. straps
8 #2 x 3/8" wood screws
2 wing tip blocks 3/4" x 1½" x 6"
1 5/32" music wire

MISCELLANEOUS:

2 nylon bolts 1/4-20
4 5/32" wheel collars
1 1/16" music wire
2 1/4" dowel (pushrods)
6 link rods, ends threaded 2-56
6 clevises
4 control horns
1 package of 15 hinges
Contact cement for wing sheeting
1 metal or nylon engine mount with bolts, blind nuts, etc.
1 6 or 8 oz. fuel tank
1 7/8" tailwheel
1 tailwheel bracket
2 main wheels 2¼" or 2½"

OTHER: Wing seating tape, spruce servo mounting rails, 1/4-20 tap, covering material, thread, fuel tubing, fiberglass cloth.

I really like this Li'l Swift and I hope you do too. If you build one you're proud of, send me a photo of it in care of RCM. I can't guarantee a reply but I'd enjoy hearing from you.

Good luck and good flying! □

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