

Wyndigo

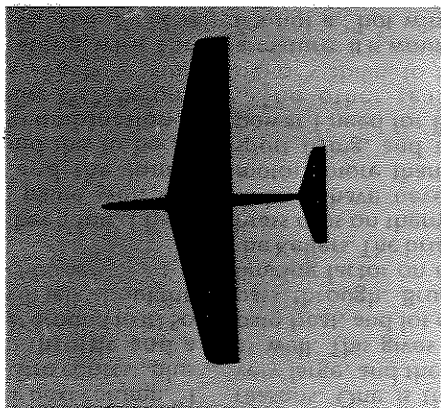
Aerobatic

Mini-sailplane

By PETE ROEHLING

• Those of you lucky enough to have seen a hot pilot wring out his SR-7 in a strong wind know what it's all about. You keep wishing that you could get that sort of performance out of something that would fly in light air conditions. I set out to design just such an aircraft, and succeeded beyond my expectations. I was so pleasantly surprised and captivated by this slope machine's performance, I named it the *Wyndigo*.

I went small and light to get a low frontal area and wing loading. I gave it a home brewed, semisymmetrical section with a very sharp entry to get good penetration and stall; I mixed in a low aspect ratio wing and a short tail moment to ensure good response. I



must admit that I evoked the *Wyndigo* with a bit of the old, "If it looks good, it'll fly good," philosophy. Imagine my enchantment when it all worked!

The *Wyndigo* is meant for winds between six and 20 mph, and in that range, you won't find a plane more fun to fly. She rolls faster than my SR-7, flies inverted quite nicely, and her instant response and forgiving stall make landings a downright pleasure. Its only weakness is that the wing section will not permit outside maneuvers to be as tight as inside ones. You've gotta pay *something* for that floating ability folks!

The day of the "vest pocket" aerobatic sailplane seems to be upon us, and as you can build 'em faster and cheaper, plus carry, fly, and land one almost anywhere, I'm all in favor of the idea!

Which brings us to one last fact. Due to the *Wyndigo*'s small size and instant control response, it is not a beginner's airplane. It will be upside-down and heading for that final excavation before your average floater begins to respond



to the rudder. However, the *Wyndigo*'s total lack of bad habits means that anyone with a reasonable amount of aileron time can fly it. Just treat it with respect until you get used to the idea that it will respond more quickly than anything you've flown before without an engine...

I'm a hate-to-build but love-to-fly sort and the *Wyndigo* is that sort of airplane. It's designed to build fast and cheap. In fact, the prototype was built mostly from leftover scraps! I am known as a slow (read "lazy") builder, but even I had the first one in the air in less than a week.

The *Wyndigo* was designed around the new "mini" radio systems, but it will swallow a standard size Futaba four-channel receiver with careful fitting. You will also need two mini servos and a standard 250 mah battery pack.

The lower you can keep the wing loading, the better your *Wyndigo* will fly. Use light woods, forget the word *fiberglass*, and go easy on the amounts of glue you use. If your *Wyndigo* weighs in at more than 17 ounces you built it a bit too strong!

As you will see on the plans, the construction is conventional. Experienced builders can almost skip the instructions.

WING CONSTRUCTION

Cover the plans with waxed paper to prevent them from becoming a part of the airframe. Pin the sub-TE and the bottom spar to the plans. Glue the ribs to them with cyanoacrylate (CA) glue. Add the top spar, and rib and tip braces with CA. Fit and glue in the shear webbing. Use Titebond or thick CA for the shear webbing and the center section TE, which comes next.

When dry, lift the wing from the plans and sand the leading edge of the ribs to ensure that they line up perfectly. Now glue on the leading edge with Titebond or thick CA. Use tape to hold it in place (Titebond) until dry, or hit the CA with accelerator (Hot Shot, Zip Kicker, X-cel). Next, sheet the center section with 1/16 hard balsa, and glue on the tip blocks. Shape the leading edge and the tip blocks with a wood rasp and sandpaper. The leading edge should be knife sharp! Do not round it off!

When the wings are ready to join,

sand the wing roots with a block to get a perfect joint. The wing must be perfectly flat (no dihedral) on the bottom, and the sub-TE should be in a straight line from tip to tip. Now, glue in the wing lining plugs. Use epoxy, Titebond, or thick CA. Join the wings with a minimal amount of glue, and wipe off the excess from the outside before it sets.

The aileron servo cutout is made just aft of the spar. Glue a small chunk of ply to the sheet behind the cutout for the servo hold-down screws. The front screws go into the bottom spar.

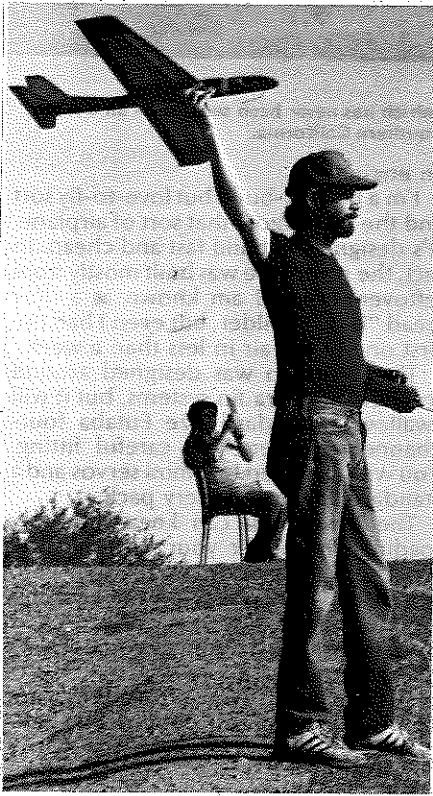
Glue on the bottom wing root brace, next, making sure that it is centered and that the aileron control horn holes are centered on the joint between the TE and the sub-TE. Glue on the tip skids.

At this point, you must install the aileron control horns. I used a Du-Bro 1/2A set to save weight. The tubes are buried flush with the top of the wing, and run straight down the TE/sub-TE joint. When the horns are in and working smoothly, epoxy on the circular top wing root brace. Avoid getting any glue into the works!

Cut the ailerons to length, leaving 1/16-inch clearance at each end. Sand the aileron leading edges to a 45° angle to allow for aileron action, and line up and drill the holes for the control horns. Fine sand the wing and ailerons to prepare for covering, but do not cover either until the wing and fuselage have been mated, and the wing fairing block has been added and carved to shape. After covering, the ailerons are hinged on top, using tape or Monokote.

FUSELAGE

Cut out the sides and the ply nose doublers, laminating them together with epoxy as indicated on the plan. Make sure you make a right and a left side! Cut out the ply bulkheads F-2 and F-3, and epoxy them to the right fuselage side. Now, set the right fuselage side (with bulkheads) bottom side down on a flat surface and epoxy the left fuselage side to it. Make certain that the sides line up, both front to back, and top to bottom! Add the 1/4-inch triangular corner braces and the wing saddles at this point. (Yes, I know it's harder to do it this way, but it's also much stronger and costs no weight.)



The author waits for traffic to clear before tossing his ship into the wind.

Add bulkhead F-1, holding things together and straight with large rubber bands. Taper off the 1/4-inch triangular corner braces toward the rear until you can pin a chunk of 1/4-inch square balsa between the rear edges of the sides. This will later be removed to provide an exit for the elevator pushrod and the antenna tube. Glue on the fuselage bottom with Titebond or CA, and trim it to size when dry. Now is the time to install the wing hold-down dowels. If you can't stand the sight of exposed rubber bands, there is ample room to use nylon hold-down bolts.

Next, we install the elevator pushrod and antenna tubes. Use a small amount of epoxy and microballoons to glue the tubes tightly to the fuselage sides in the area of the aileron servo, providing clearance for the servo arms. You may now remove the spacer from between the rear fuselage sides.

Glue in the 1/8-inch triangular corner braces flush with the top front of the sides. Now, glue on the top front fuselage and hatch as one piece, gluing *only* the portion you wish to permanently remain! The hatch will be cut off after shaping.

Sand the front of F-1 flat to mate up with the nose block. The block is laminated together from two 1/2-inch balsa blocks with the nose skid between them. (Yes, the skid is ugly, but it will save you many a boring minute of patching up dings. If you always land on soft, deep grass, go head and leave it out.) Glue on the nose block with the skid facing downward. When dry, carve and sand the fuselage and nose block to a streamlined shape.

Now, cut the hatch loose from the front fuselage top. Epoxy in the servo rails and the ply fuselage braces that go diagonally, just forward of bulkhead F-2.

The radio hatch may be fastened in a number of ways. I used 1/32 ply tongues that reached below the fuselage top and the wing root. Velcro also works well, and tape is the easy way.

Use epoxy and microballoons to glue on the tail skid. Do *not* leave off the tail skid! Wyndigo's lateral stability suffers when you remove that much fin area. Anyhoo, most Wyndigos need tail weight, and the skid is where you epoxy it on!

After mating the wing and fuselage, epoxy the soft balsa wing fairing block to the top front of the center section sheeting, and carve and sand it to shape.

TAIL FEATHERS

I used 1/8-inch hard balsa for the leading edges due to its "weed cutting" ability, but you could just use normal 1/8 sheet for the entire assembly. Coat the tips with a bit of epoxy if you anticipate any inverted landings. Make certain that the tail surfaces line up squarely with the wing when you glue them to the fuselage. Hinge the elevator with tape or Monokote after covering.

COVERING

Any strong and lightweight covering material will work well. It's a good idea to cover the top and bottom surfaces with highly contrasting colors. Nothing can ruin your afternoon faster than losing track of which way is up. I use high-contrast stripes on my upper wingtips to help prevent disorientation.

CONTROL SETUP

Aileron throw is 3/8 of an inch in both directions. If unsure of your ability to react quickly enough, start at 3/16 and increase as your skills improve. Differen-

tial aileron throw is not needed, and will only make inverted flight more difficult. The elevator servo arm should be skewed to give at least 3/8 up and 7/16 down elevator. The extra down elevator throw is needed if you wish to do outside loops, etc.

FLYING

Balance the Wyndigo 5-3/8 inches forward of the wing's trailing edge. Take your Wyndigo to your favorite flat field for hand launch trimming. Trim for a flat glide with a hard launch. Don't underestimate its floating ability; use a large field.

When everything is trimmed properly, proceed to the nearest slope and toss off into the wind. Use a bit of caution until you've gained some familiarity with it. Being small and light, the Wyndigo will get tossed about more than conventional aerobatics soarers, but the extremely quick control response means you have the ability to recover equally quickly. When you are accustomed to this, grab some altitude and start bending it around the sky.

Landing in smooth air is a joy. Just steer the glider in and flair out to burn off speed before touchdown. Or, come in high and snag it out of the air as it floats past you.

When landing in turbulent air, I prefer to come in quite "hot" on the downside leg, and pull a stand-it-on-one-wingtip pylon turn into the wind before touchdown. It might be a good idea to try out this approach with some spare altitude the first few times.

As mentioned before, the Wyndigo has no bad habits to speak of, but it does have one good one that is shared by few other sailplanes: the ability to make one laugh out loud while just stoozing around the sky.

