

PHOTOS BY DAVE GIERKE & GEORGE BAYNES

# Formula 1 → **STINGER** ← Formula 1

By **GEORGE BAYNES** . . . Aside from being a proven winner, this ship has the additional feature of being entirely independent of manufactured foam or fiberglass structures. A good hobby shop has all you need.

• The Stinger was designed with thoughts of having a Formula 1 racer that performed well and also looked different from the rest, both on the ground and in the air. On both counts, I believe I have succeeded.

I have been racing with Stingers for three seasons now, but 1977 was its best year. At seven U.P.R.C. races run during 1977, Stingers racked up a score of one first place, six second places, and one third place; failing to place at only one race. Dave Kelly took the U.P.R.C. Season Points Championship with his Stinger, and I won the High Point Canadian Perpetual Trophy at the Canadian Nationals with mine.

I had previously built and raced three of Joe Foster's "Sharks", which appeared in M.A.N., mainly because of its distinctive appearance. The Shark handled well in a race, but the grass runways we fly from in this area (United Pylon Racing Circuit, Western New York and Southern Ontario) are too rough for torsion bar type wire landing gear. When I happened to see the three-views and pictures of the full size Stinger, it seemed like the answer to my landing gear problem, and it had a semi-elliptical wing for a distinctive appearance.

Being a shoulder wing plane, the tempered aluminum landing gear would be solidly mounted in the fuselage, and solid it is. I have bent the landing gear almost double a couple of times, in disgustingly sloppy landings, with never a trace of stress cracks, or any other damage to the fuselage.

Takeoffs from grass or asphalt are

a cinch, no rudder, a slight amount of up elevator, and it's off in six feet or less.

Landing after a race is where the Stinger really shines. The ailerons are just as effective at landing speed as at full speed, and having a long flat glide path, it can be held a foot or so off the ground for 200 feet or more, until speed drains off, resulting in a very nice two-wheel landing with no tendency to nose over.

## CONSTRUCTION

It is assumed that anyone tackling a Formula 1 model has enough building and flying experience under his belt to have his own favorite building methods. Therefore, this discourse will be quite basic. Individual preference will determine adhesives used, radio installation, cowl mounting, finishing methods, and the like.

## WING

The Stinger wing is built very much like the Shark wing in Joe Foster's excellent construction article. The main changes are the leading edge outline, aileron placement, and the sheeting being 3/32 rather than 1/16.

Butt glue two 4 x 24 inch pieces of medium hard 3/32 sheet for each wing skin. After drying, cut the two bottom skins to the outline shown on the plan and taper the last 3/4 inch down about 1/64 at the trailing edge. Mark the rib locations on the outside. Pin or weight the two bottom skins on a hinged building board set at the dihedral shown on the plan.

Cut the spar from 1/8 hard, straight-grained balsa and glue and pin it in position, using a small tri-

angle to make sure it is flush with the edge of the sheeting and at a 90 degree angle.

When the spar has set, the ribs are made thusly: at each rib station, a square-cut piece of 3/32 sheet of sufficient dimensions is placed in the rib position, butted firmly against the spar. With a ballpoint pen, mark it at the top of the spar and the taper line 3/4 inch ahead of the trailing edge. Using a straight edge, draw a line connecting the two marks, cut along this line, and there is your rib. Glue it in place and go on to the next. The center rib is cut from 1/4 inch balsa.

After all the ribs are in place and the glue is dry, the top skins are applied. They are cut 1/8 inch oversize along the trailing edge, and are sanded to match the bottom skins later. You will need plenty of weights spread over this while the glue is drying, as the top surface is curved.

The trailing edge is best glued with epoxy, as a water-based glue could cause warping.

After drying overnight, the wing can be removed from the building board, and the top wing skins trimmed at the trailing edge to match the bottom skins.

The leading edges are cut from 1 x 3 inch medium-soft balsa to the outline shown. After notching the rear surfaces for the plywood dihedral brace, they are glued to the front of the spars, level with the bottom of the wing. Cut the wing tips from 3/8 inch balsa, and install. Epoxy the 1/8 plywood dihedral brace in place, fill the rest of the notch with 1/8 inch balsa, and add the 1/8 sheet

filler which brings the center portion of the leading edge up to the spar height.

With a balsa plane and sanding block, shape the leading edges to the airfoil shown on the side view and work the wing tips down to blend with the rest of the wing. At this point, the whole wing should be sanded smooth using a sanding block with medium paper.

Using the aileron outline on the bottom wing skins, draw a line along the aileron leading edge to the center of the wing as shown on the plan. Draw another line 1/4 inch ahead of this and repeat both lines and aileron outlines on the top surfaces.

The ailerons and the remaining in-board trailing edges are cut separately from the wing structure and set aside. The remaining 1/4 inch strip is cut away and replaced with a 1/4 x 3/8 inch hard balsa rear spar. When in place, the rear spar must be shaped to match the top and bottom wing surfaces. Be very careful not to round off the rear corners.

Install the 1/8 inch aileron torque rods in 5/32 tubing, and epoxy them in position. Use a straight edge on the bottom wing surface to be sure all is true and straight.

Ailerons can be made from 3/8 inch medium balsa, or you can remove 1/4 inch from the leading edge of the built up pieces previously removed, replace with 1/4 inch sheet, fill in the ends, and sand to shape.

Now is the easiest time to fiberglass the wing, before it is built into the fuselage. I like to use 3/4 oz. cloth and K&B finishing resin.

#### FUSELAGE

Make right and left fuselage sides from 3/16 x 4 inch sheet. Cut to the outline shown on the plan. Contact cement the 1/32 plywood doublers

in position and mark a full length center line and the former locations on the inside of each side. The 1/4 inch balsa fuel tank compartment triplers and 1/8 inch plywood landing gear mount braces are now contact cemented in place.

Before cutting out the formers and firewall, mark them with both horizontal and vertical center lines to facilitate alignment.

The fuselage is best assembled inverted in a fuselage jig. Align the former and firewall center lines drawn on the sides, and get everything square and true, especially the firewall. Any side or down-thrust is definitely not required. Slow-drying epoxy is best for installing the firewall and formers. Before installing the firewall, mark and drill for motor mount bolts, and install blind nuts. Also drill fuel line holes and engine shutoff cable hole.

When the epoxy has set-up, and with the fuselage still inverted in the jig, the elevator and rudder control cable tubing can be installed. Make sure both ends are firmly secured and properly aligned.

Now the 3/16 bottom sheeting and the 1/4 inch plywood landing gear mount can be glued in place. The radio compartment and fuel tank compartment hatches can be fitted and mounted next. Remove the fuselage from the jig and plane and sand the belly into shape.

The wing is now installed. The flat-bottom airfoil makes the incidence alignment easy. The leading edge must be 1/8 inch lower than the trailing edge. Line up the center of the wing at the trailing edge with the vertical center line on former No. 2, and get the wing tips equidistant from the tail. Five-minute epoxy is sufficient here, as the wing is later built right into the fuselage.

The horizontal stabilizer, with elevator hinged in place and controls connected, is now carefully aligned and glued in place. Next, the fin is installed, making sure it is 90 degrees to the stabilizer and true fore and aft.

Now the top sheeting, the turtle-deck, and the noseblocks can be fitted and glued in place. Cut the cockpit to shape, paint the interior, install instruments and pilot. No cockpit floor is required, the top of the wing is just about right. Trim the canopy to fit and install. The fuselage can now be sanded to fit its final shape.

The cheek cowl can be carved from balsa or molded from fiberglass, depending on individual preference. The cowls run back to the wing, and the epoxy-lite wing fillet is continued right around the cowls. The fin and stabilizer are also filleted with epoxy-lite.

It will be necessary to file away a little wood from the fuselage sides in order to fit the landing gear flush against the 1/4 inch plywood mount. With the hatch in place, there should be no gaps.

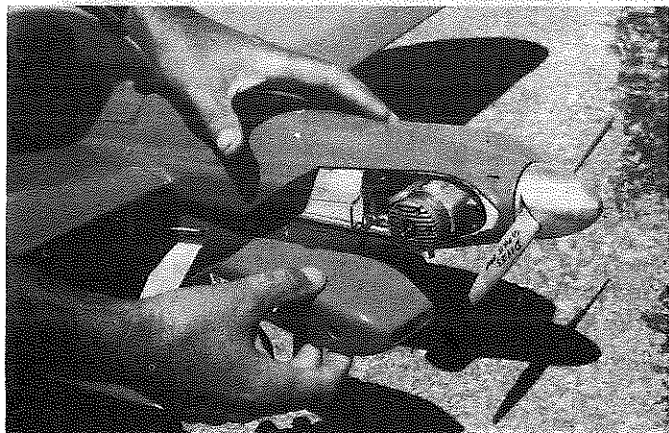
Two coats of finishing resin, with no cloth, seems sufficient for the fuselages of all the Stingers built to date. A heavy coat of K&B primer, well sanded, makes a good base for your choice of paint.

#### FLYING

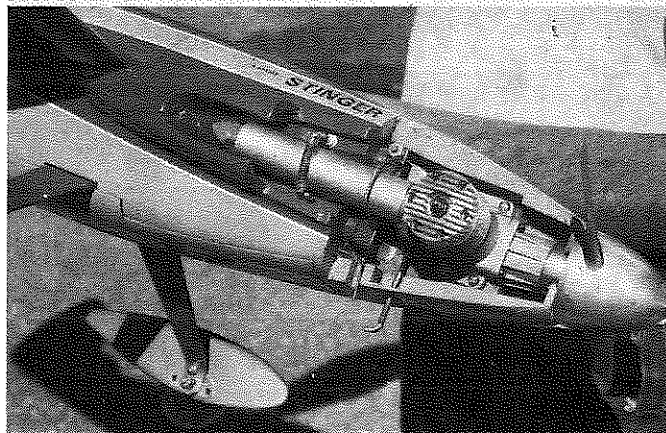
The balance point should be no more than 3 inches back of the leading edge with the fuel tank empty. The throws on all control surfaces should be no more than 3/16 inch each way.

Hold about 1/2 up-elevator, and when released, the Stinger will lift off almost immediately with no turning tendency. The rest is up to you. ●

## MODEL BUILDER



Side-port K&B installation in Kelley's Stinger. It says, "Davies go for it prop," on blade closest to camera.



Clean installation of K&B rear exhaust 40 in George Baynes' ship. Note lever for hand operation of cut-off.

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