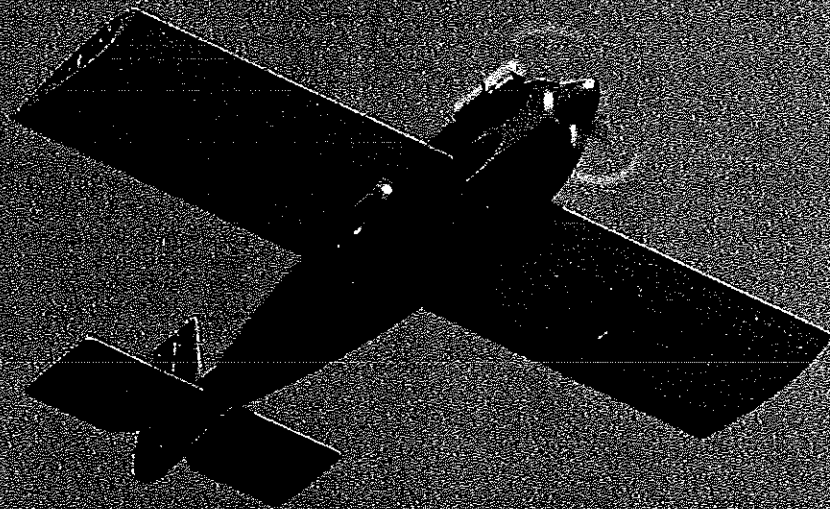
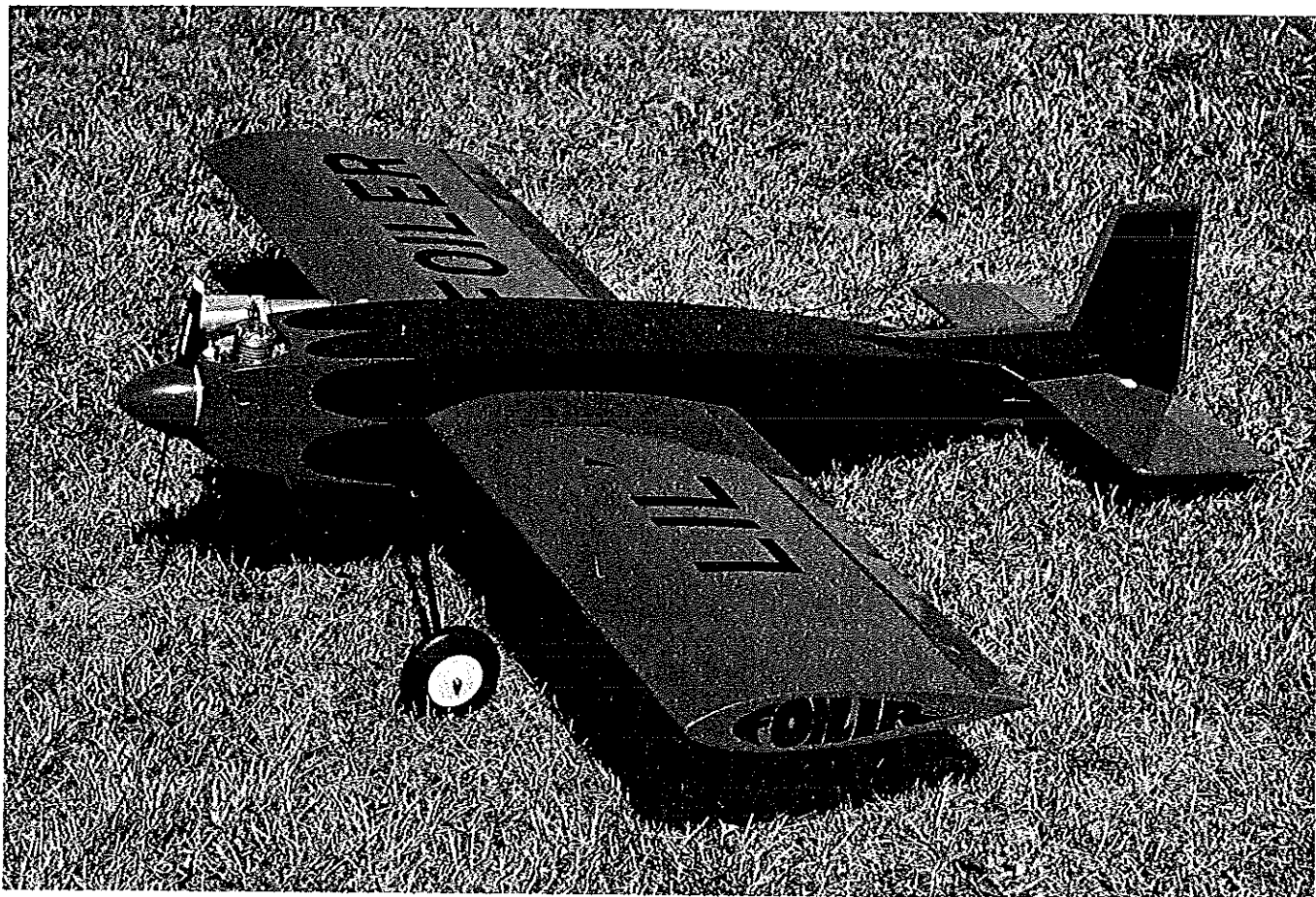


Pared down
for .40- to
.51-size
engines, this
RC sport model
flies with
the same
spry authority
that made its
.60-powered
sibling
so popular.
■ John Tanzer



#721

Lil' Foiler

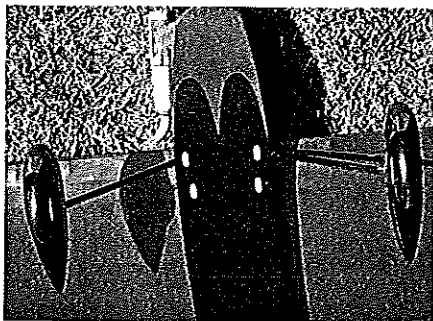


Opposite page: In flight, Lil' Foiler has all the easy maneuverability of its much-admired predecessor. Above: The same airfoil-shaped fuselage used in Foiler (MA, May '91) gives this version a like advantage in stability. Note the chubby yet sleekly aggressive styling.

MY .60-powered RC Foiler, published in the May 1991 issue of *Model Aviation*, was so well liked by club members that they talked me into designing a smaller version for .40- to .51-size engines. The result is Lil' Foiler.

I shortened the wing to 48½ in., giving 615 sq. in. of area, but used the same airfoil. The fuselage too is six inches shorter and an inch thinner, and the tail has been scaled down as well. As with the original, larger design, the airfoil shape of the fuselage enhances stability in all flight attitudes.

Lil' Foiler is small enough to be transported to the flying field fully assembled. It weighs 4½ to 5 lb., depending on such factors as the materials and type of finish used.

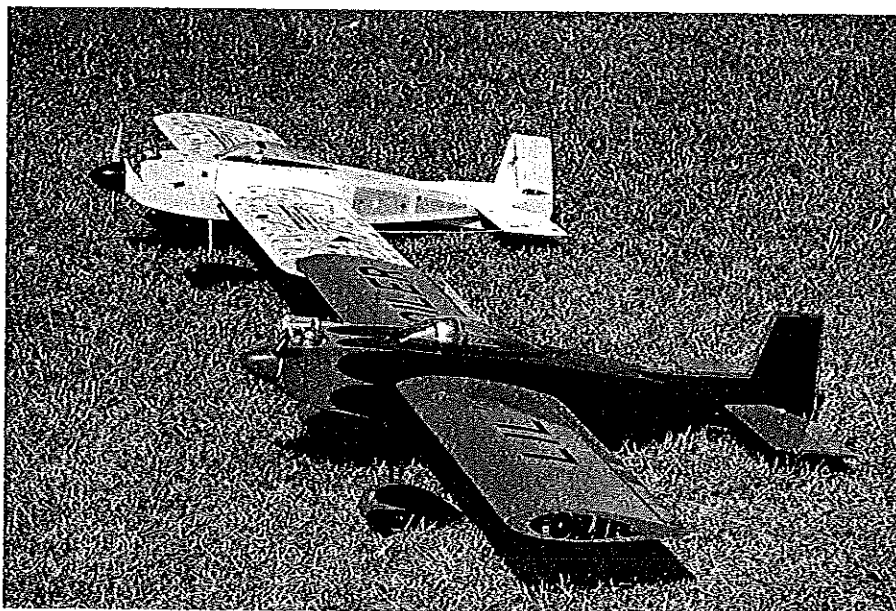


This model is a joy to fly. Taxiing out is easy—the tail wheel in the bottom of the rudder works like a charm. Add power, and takeoff is straight, with no veering to the left. A snap roll on takeoff is quick and easy. Release the sticks, and the craft straightens out again. Directional stability is phenomenal; yet when you want to do

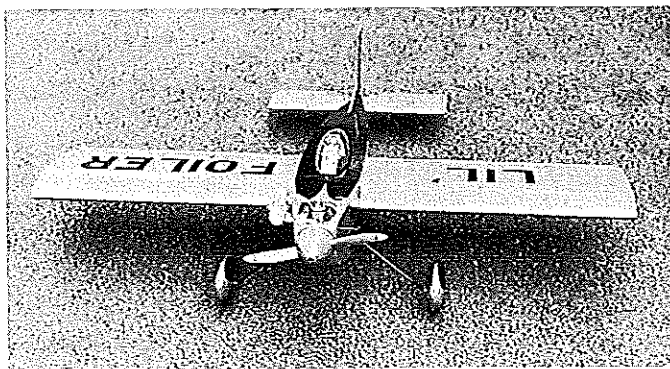
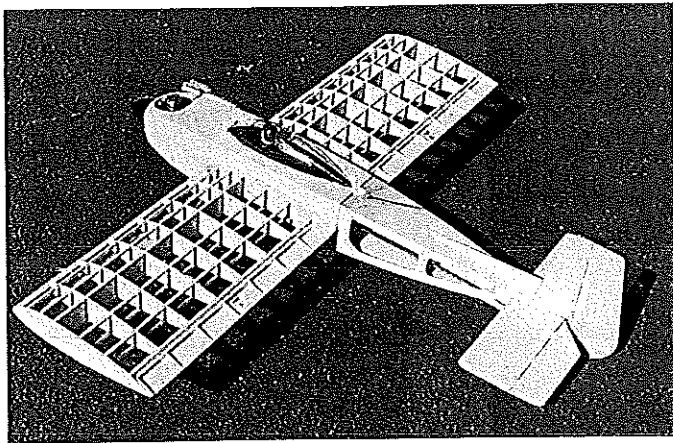
something wild, Lil' Foiler responds immediately. Lomcevaks, snap rolls, knife-edge, inverted flight, rolling circles, point rolls, slow rolls—this model will do it all.

Stall speed is so slow that the plane almost comes to a stop.

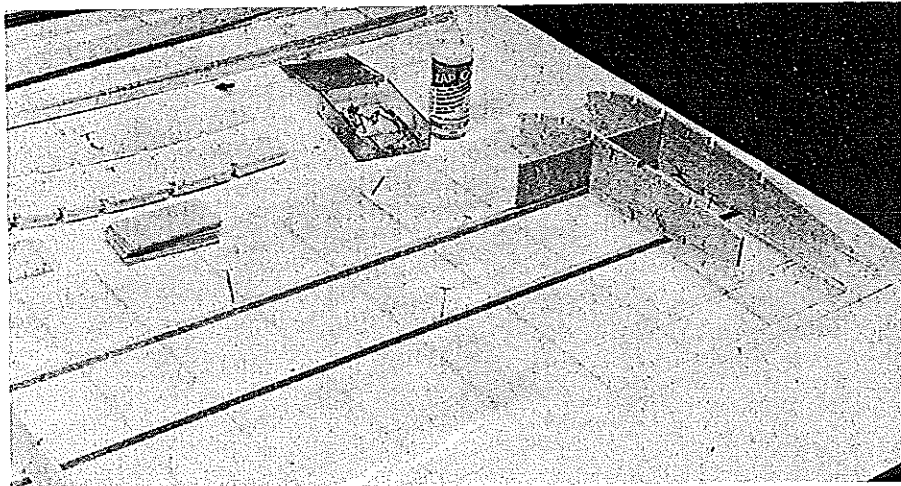
My friend Mike Schillizzi built a Lil' Foiler. He's using a SuperTigre .51; I'm



Left: The landing gear is 5/32 music wire mounted to the fuselage with nylon straps. Right: The author's version (foreground) uses red Micafilm, black UltraCote. Mike Schillizzi's (rear) has pearly white MonoKote, multicolored trim.



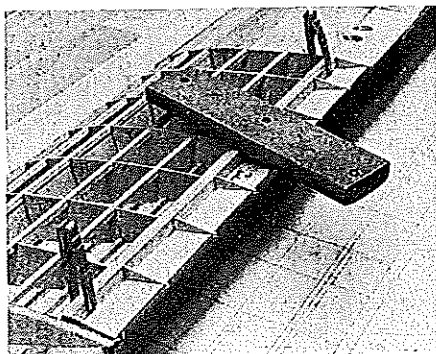
From bare bones (left) to finished model. The black UltraCote on the fuselage and rudder is trimmed with Hobbypoxy red paint.



The wing under construction. To maintain alignment between ribs and spar, each rib is glued in along with its shear web. Note the shim under the rib at the rear of the wing.

using a Royal .45 ABC. Both models are quite fast—too fast for me, I might add; I fly at reduced throttle. We have found that the plane can be slowed down for a spot landing much more easily with an 11 x 6 or 11 x 5 APC propeller than with a high-pitch prop.

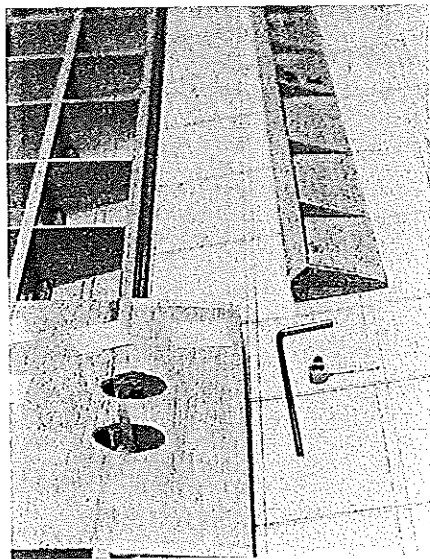
The basic structural design of the original Foiler is unchanged, though I added an optional canopy and wheel pants for improved appearance. Don't be put off by all the wing subspars. This construction method is easier, faster, and lighter than using a sheeted D-tube and cap strips, and the wing is just as warp-free once it is covered.



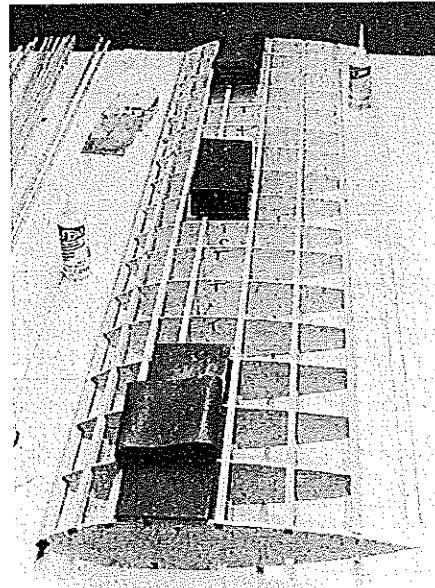
With the aileron clamped to the TE and centered with the airfoil, the aileron ribs are being sanded to match the airfoil.

Construction

Wing: Cut a master rib pattern from $\frac{3}{32}$ balsa sheet. Check all notches for fit, using a piece of $\frac{1}{4}$ -in.-sq. balsa. Sand the pattern to accurate contour. When it looks good enough to serve as a template, harden the edges by soaking them with Zap. Mark the



The author uses a nose gear tiller arm as an aileron control horn. Torque tube is a piece of $\frac{1}{8}$ -in. music wire. Center section wing block has been added and shaped.



Top spars, LE, and TE have been installed with the wing weighted and shimmed for good alignment. Bottom spars and dowel plates are added before sheeting.

top with a *T*; this will keep all the notches in perfect alignment.

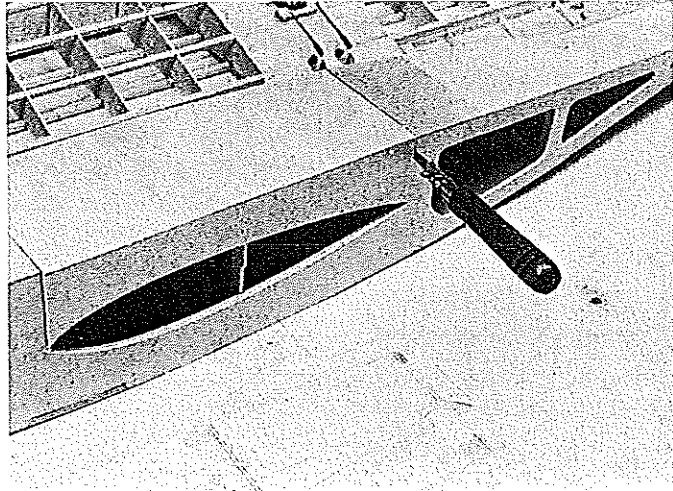
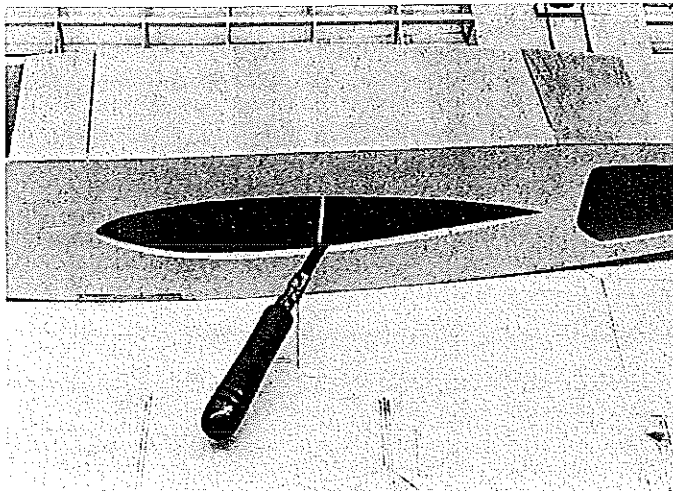
Use the master to cut out all but the center wing ribs. Stack the ribs, and sand them to shape. Don't forget to mark each rib at the top.

Cut the five W-2 center ribs. These are $\frac{3}{32}$ in. smaller at the top and bottom to accept the $\frac{3}{32}$ balsa sheet at the center of the wing between the spars.

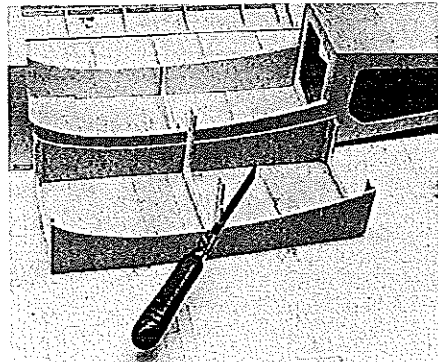
Cut 16 vertical-grain shear webs from $\frac{3}{32}$ balsa sheet. Stack the shear webs, and true them up with a sanding block. The wing is built in one piece using four-foot-long spars and subspars. The spars, leading edge, and trailing edge must all be perfectly straight to ensure a warp-free result.

Cover the plan with clear plastic or waxed paper. Pin down a hard balsa spar and a $\frac{1}{4}$ -in.-sq. shim at the location shown on the plan. Add a $\frac{3}{32}$ shim for the W-2 ribs at the center. These shims keep all the ribs level during construction.

Begin installation with a W-1 rib at the wing tip. Pin it in place at the spar and at the shim, keeping the *T* mark at the top. To ensure that the ribs remain plumb with



After F-3's center section has been cut out (above left), both fuselage sides are cut with a Zona saw (above right) to remove the wing hatch from the fuselage (below left).



1/8-in. ply dowel plates at the leading edge. Cut the 3/32 balsa sheet to width, and fit it between the spars at the center of the wing. Hold a piece of sheeting against one of the spars, and cut a mark in it at each end of the adjacent spar with a No. 11 X-Acto blade. Remove the sheeting, and finish cutting it to the correct width using a metal straightedge as a guide. You may have to sand the strip lightly to fit.

Pick up the wing, and remove the 3/32 shim at the center. Turn the wing over, and pin or weight it down on one of the 1/4-in. spars to finish sheeting the center of the wing. Cut two wing tips from 1/4-in. balsa sheet, and glue them in place. Sand the trailing edge flush with the ribs. Plane and sand the leading edge to a round radius; sharp leading edges cause abrupt stalling and aggravated pitch sensitivity.

Make two aileron torque rods from 1/8-in. music wire. Use plastic, aluminum, or brass tubing for a bearing. Glue the bearing to the trailing edge. Cut a groove in the balsa block for the aileron bushings and two holes for the aileron horns. Glue the block in place. I use two nose gear steering arms for the aileron horns, since they can easily be removed while the wing is being covered. After the plane has been covered, it's wise to use a drop of Zap to prevent the aileron horns from slipping on the torque rods.

Plane and sand the balsa block to

shape. Sand the wing sheeting. Cut two ailerons from 3/32 balsa sheet. Glue 3/32 x 1/2-in. balsa sticks to the front of the aileron at the top and bottom.

Cut 32 rib tails from 3/32 balsa. Clamp the aileron to the trailing edge, centering it with the airfoil. Add the 3/32 balsa rib tails at the proper locations, top and bottom. Using a sanding block, fair the aileron ribs in with the airfoil. Use 80-grit paper for rough sanding.

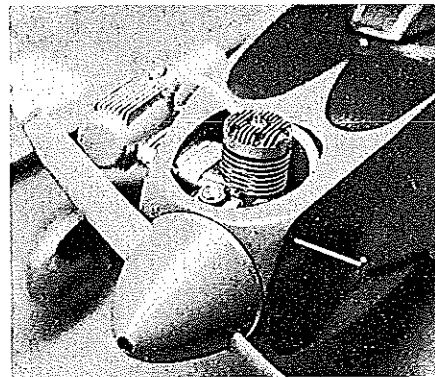
Install balsa blocks to secure the torque rods. Remove the ailerons, and bevel their leading edges with a block plane. Drill a 1/8-in. hole in the end blocks for the torque rod. I use Sig Easy Hinges on the ailerons. Cut the slots for the hinges in the wing

respect to the spar, be sure to install each rib together with its shear web, holding both parts as you Zap them in place. Work your way into the center of the wing, but leave the center rib out. Repeat the process with the second panel, again working from tip to center.

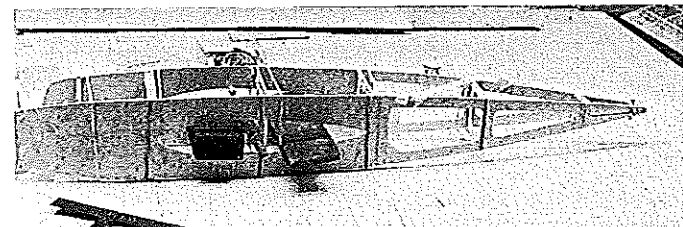
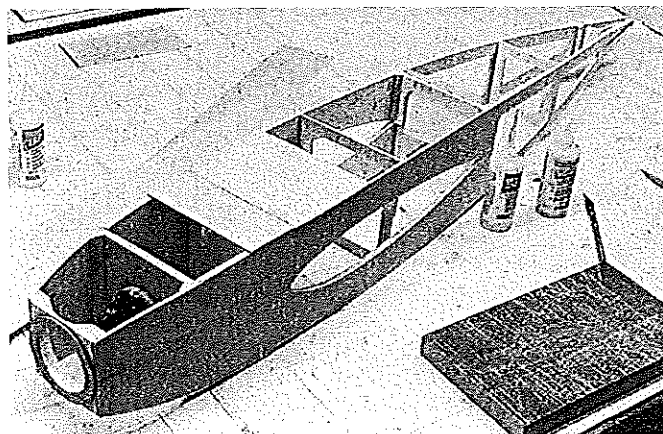
Don't be concerned if your ribs fail to align with those shown on the plan. Should your webs be a little longer or shorter, only the width of the center bays will be affected. If your center bays are narrower than those shown on the plan, you'll have to cut down two webs in order to fit in the center rib.

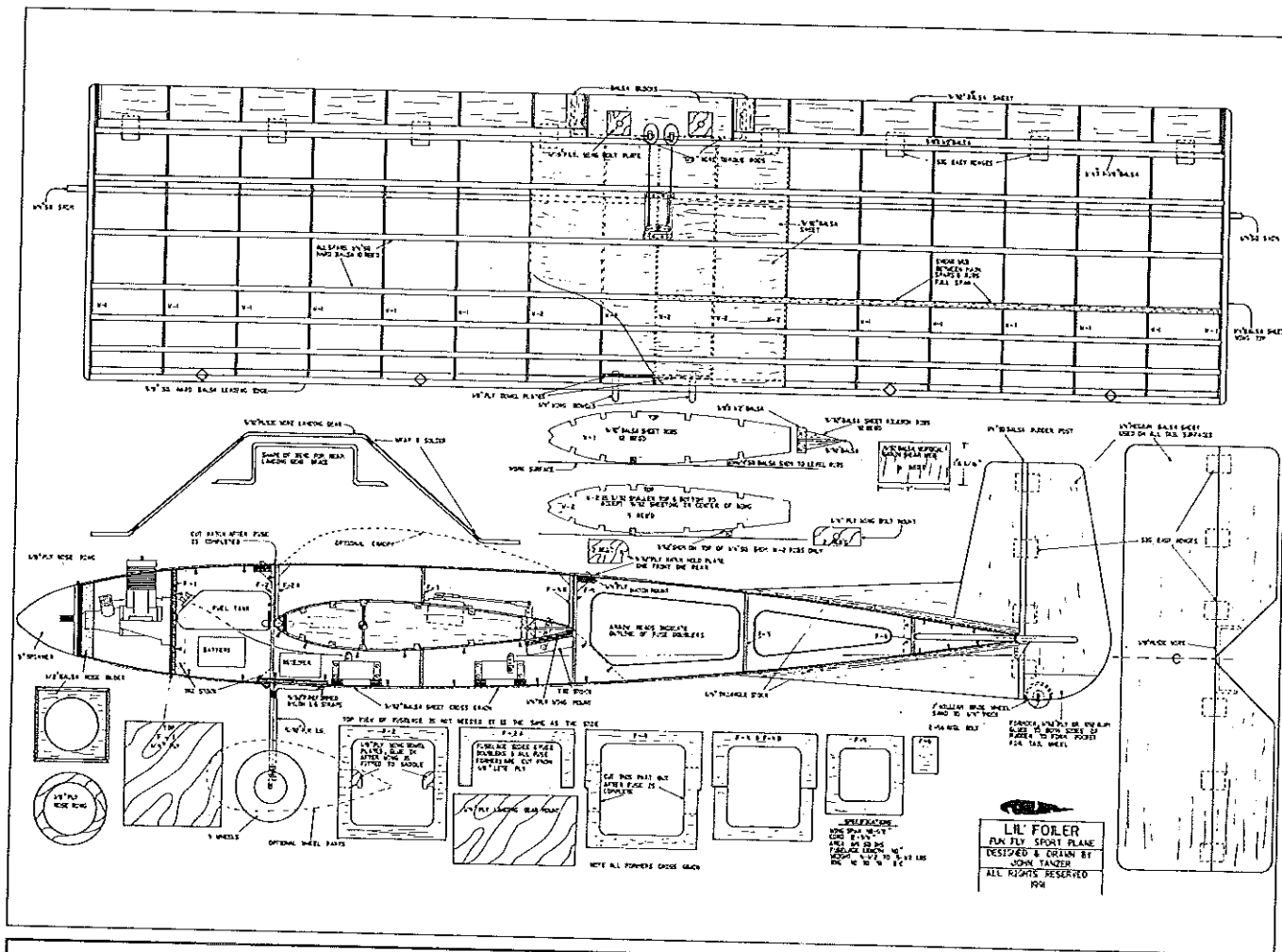
Add the 1/4-in.-sq. hard balsa spar and subspars. Cut the 1/4 x 1 1/8-in. trailing edge oversize so that it extends equally above and below the rear of the ribs. It will be sanded flush later. Zap the trailing edge to the rear of the ribs.

Glue in the 3/8-in.-sq. balsa leading edge. Remove the wing from the plan, turn it over, and pin and shim it as before. Glue in the remaining (bottom) spars. Install the



Below: The fuselage parts are over the plan ready for gluing. Right: Fuselage sheeting under way. Above right: Completed engine installation is roomy, neat. The extension on the exhaust stack allows the muffler to clear the fuselage.





RC Lil' Foiler

Type: Sport
 Wingspan: 48 1/2 in.
 Recommended engine size and type:
 .40- to .51-cu.-in. two-stroke
 Number of RC channels
 recommended: Four

Expected flying weight: 4 1/2 to 5 lb.
 Type of construction: Built-up
 Type of covering/finish
 recommended: MonoKote; or
 Micafilm on wings and stabilizer,
 UltraCote on fuselage and rudder

slot for the stabilizer at the rear.

Cut lightening holes in both sides. Cut the 1/8-in. Lite Ply front and rear doublers, using the arrowheads on the plan as a guide. Glue the doublers to the inside of the fuselage.

Clamp the sides together, and true them up by sanding. Cut the nose ring from 1/8-in. ply. Cut and bevel the 1/2-in. balsa nose block. Cut the firewall (F-1) from 1/4-in. ply. Cut all the formers from 1/8-in. Lite Ply. Lay the sides on the plan, and mark the locations for the formers.

Rubberband the fuselage together at the rear; use 1/4-in. scrap balsa in the stab slot to prevent squeezing it shut. Pin and rubberband the firewall in the front, flush against the doubler; don't glue it in yet.

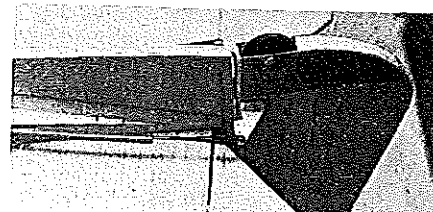
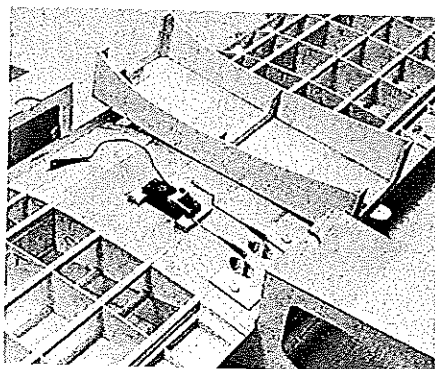
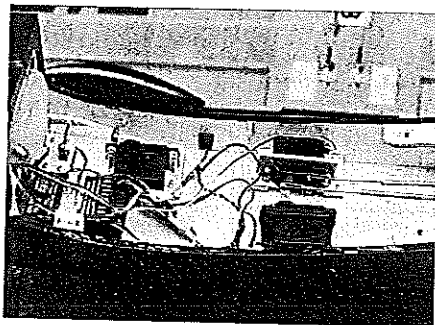
Accurately emplace all the formers using rubberbands. The nose block, nose ring, F-2A, and F-4B are not installed at this

Continued on page 54

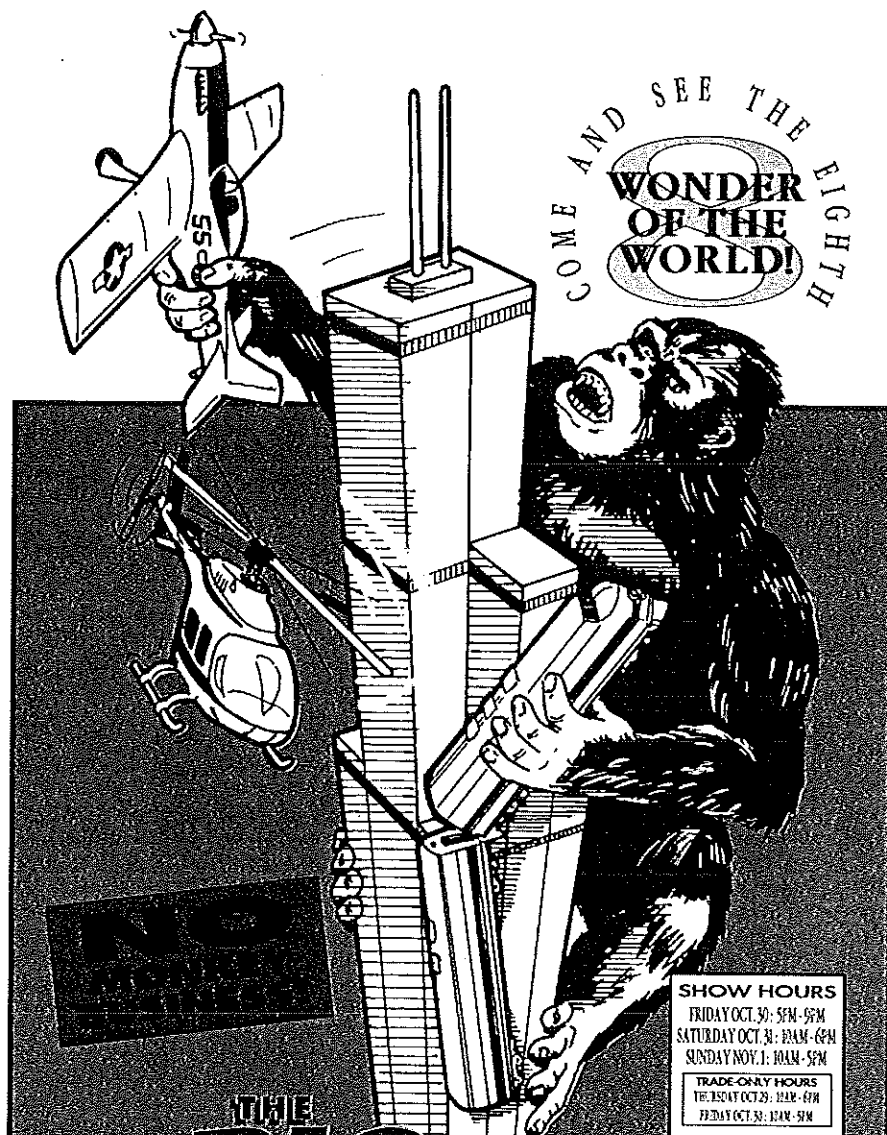
trailing edge and ailerons, and make a trial fit. Do not glue the hinges yet. I install the aileron servo at this point, plugging it into a flight pack to check for smooth operation. Set the wing aside while you proceed with the fuselage.

Fuselage: Cut the sides out of 1/8-in. Lite

Ply, making them full length from the nose ring to the rudder post. Carefully mark the sides for the airfoil-shaped cutouts where the wing will be mounted, and make the cutouts. Do not make the vertical cuts at the leading and trailing edge at this point. Cut a



Left: Control system detail. Fuselage servos actuate flex cable for throttle control and plastic-sheathed steel pushrods for the tail surfaces. Center: The wing hatch removed, showing forward wing dowel plates, aileron servo, and wing bolt plates. Right: Tail wheel



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Lil' Foiler

Continued from page 48

point. Place the rubberbanded fuselage on the plan side view, using it as the top view. (The top and side views are actually identical.)

Weight down the fuselage. When it is straight and in alignment, Zap all the joints. Pull the front together, glue in the nose block, and add the nose ring.

Glue in the F-2A and F-4B hatch formers, keeping them separated from formers F-2 and F-4 with spacer strips cut from a plastic jug. Extend the spacers above the formers to separate them from the sheeting as well.

Turn the fuselage over, and glue in the 1/4-in. ply landing gear plate. Reinforce the joints with triangle stock at the points indicated on the plan.

Sheet the top and bottom of the fuselage with 3/32 cross-grained balsa. Leave the front open from a point 1 in. forward of F-2 for installing the engine. Cut the center wing section out of F-3, remove the plastic spacers, and cut down both of the fuselage sides with a Zona saw to remove the hatch. Glue in the 1/4-in. ply wing bolt mounts.

Fit the wing to the fuselage. Lay the wing in the saddle, and check the alignment. With the wing centered and straight, mark the leading edge for the 1/4-in. wing dowels that will mate with F-2. Remove the wing, drill 1/4-in. holes in the leading edge, and glue in the dowels.

Put the wing back in the saddle, and glue in the 1/8-in. ply dowel plates. Glue the 1/16 ply wing bolt plate to the top of the wing block at the bolt location.

Drill holes through the wing and the 1/4-in. ply wing bolt mounts using a #7 (13/64-in.) drill. Remove the wing, and tap the ply mounts for the 1/4-20 plastic bolts. Harden the threads with Zap.

Redrill the wing holes to 1/4 in. Glue the 1/4-in. ply hatch screw blocks to the fuselage formers. Install the wing, and bolt it down securely.

Trial fit the wing hatch, removing as much material as necessary for a good fit. Recess the hatch for the 3/32 ply hold-down plates.

Glue the plates in place. Panhead screws are used to secure the hatch. Remove the wing and hatch, and set them aside.

Install the engine mount and engine, fuel tank, and throttle cable—an easy matter with the top front fuselage still unsheeted.

Finish sheeting the fuselage, leaving an opening just large enough to remove the engine through the top. In most cases a muffler extension will be required to move the muffler outboard far enough to be clear of the fuselage side.

Fair the nose block into the spinner.

Bend the landing gear and doubler from 3/32 music wire, using the plan as a guide. Mount them to the

Continued on page 142

THE TEXACO .049 THE MILEAGE MAKER



SPECIFICATIONS:
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 (0.8189cc)
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 Stroke: 0.386 in.
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 with 7" X 3 1/2" prop
 for 4 to 5 minutes on
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 with 8" X 4" prop and up to 6
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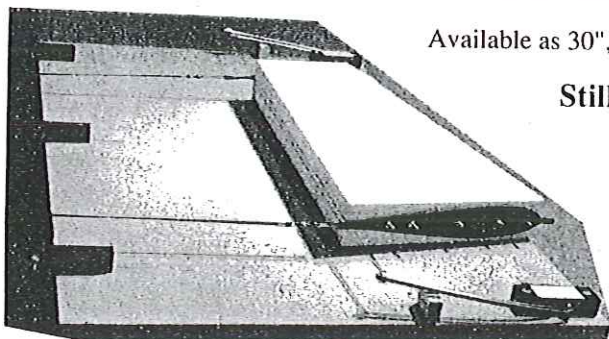


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Self Preservation

Continued from page 138

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List of Companies and Sources

- Haught Graphics, 3416 West Fairway Drive, Coeur d'Alene, ID 83814
- Peck-Polymers, Box 710399, Santee, CA 92072

Lil' Foiler

Continued from page 54

fuselage with preformed 5/32 nylon landing gear straps. Wrap the gear pieces together with copper wire, and solder them.

I don't recommend substituting aluminum or fiberglass landing gear for wire ones. Hard landings seem to be the norm in the heat of a fun fly, and wire gear won't shear off and break the wing or tail as aluminum or fiberglass ones will. The wire gear will bend, and you can bend it back to fly again.

Tail surfaces: Cut all parts from medium 1/4-in. balsa sheet. Join the elevators with 1/8-in. music wire glued in place. Bevel the front of the elevators, and temporarily insert the Sig Easy Hinges for attachment to the stabilizer. Don't glue the hinges in yet.

Glue the stab into the slot at the rear of the fuselage, making sure it's at 0° incidence with respect to the wing. Pin the rudder, fin, subfin, and 1/4-in. rudder post to the fuselage; check the alignment, and glue the assembly in place. Glue 1/4-in. triangular balsa stock to both sides of the rudder, fin, and subfin as indicated on the plan.

Cut a hole in the bottom of the rudder. Glue Formica, 1/32 ply, or .032 aluminum to both sides of the rudder to form a pocket for the one-inch tail wheel. Sand the tail wheel down to 1/4-in. thickness.

Cut a piece of brass tubing a little wider than the wheel hub to act as a bushing. A 2-56 bolt is used as an axle. Cut the slots for the Sig Easy Hinges in the rudder and rudder post, and check that the alignment is satisfactory by temporarily inserting the hinges. Don't glue them in yet. All control surfaces will be removed for covering, and the rudder post will have to be cut for removal of the elevator.

All the fuselage servos are mounted on their sides under the wing. A flex cable is used for throttle control. Steel pushrods encased in plastic tubing operate the tail surfaces.

Set the control throws at 5/8 in. of up-and-down aileron travel, 3/4 in. of up-and-down elevator travel, and as much travel as you can get for the rudder.

The center-of-gravity coincides with the

main spar location. Both Mike's model and my own balance without added weight.

Finishing: Mike covered his model with pearly white MonoKote and multicolored trim. I used red Micafilm on the wings and stab and black UltraCote on the fuselage and rudder.

I trimmed the UltraCote with Hobbycoxy red paint. This paint holds well on all plastic film. Just wipe the film down with alcohol beforehand, and remove the masking tape right after spraying on the paint.

Flying: Lots of fun here! Takeoffs are easy. Like its larger sibling, Lil' Foiler tracks straight without rudder correction. It's a very responsive little plane, but can also be quite docile. Don't be tempted to move up to a .60 engine—Lil' Foiler *doesn't* need it! Landings are easy, too. Using a low-pitch prop, you can walk the model in nose-high and set it down where you want it.

Happy Landings!



RC Aerobatics

Continued from page 59

one pushrod. I installed it on my LA-1, and it works great.

All it takes is two Du-Bro #121 EZ Connectors, two springs from a Du-Bro #120 Control Over-ride Servo Saver, a Sig #SH-659 aileron connector, and a short piece of 1/16 music wire. The figure shows how they are hooked up. The Sig aileron connector has a 1/16 hole that fits snugly on the 1/16 music wire, so there's no slop. You have to file the aileron connector flat on one side so that it will clear the servo arm. The springs keep the aileron connector centered between the servo arm outputs.

If one servo stops working, the mechanism allows the remaining servo to move the pushrod. However, the mechanism gives only about half throw instead of full throw. So I use the setup with the transmitter elevator dual rate turned on and set to about half throw. If a servo quits, I can switch to high-rate elevator and get full elevator authority back again. I haven't had any elevator servo failures since installing the system, but I'm ready!

Food for thought: Only 96 Pattern fliers were at Westover AFB, Massachusetts for the 1992 AMA Nationals. This was the smallest number in many years to enter a Nationals.

Last year, 203 Pattern fliers competed in the Lawrenceville, Illinois, Nationals. In 1985, the last time the Nationals was held at Westover AFB, there were 145 Pattern fliers.

I would like to hear from readers as to what significance can be drawn from these facts. →

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