

If you are looking for something other than a profile CL model to mount your .15 engine on, then perhaps this model is just what you've been searching for. Show up at the flying circle with this 1930s look-alike racer and watch the heads turn.

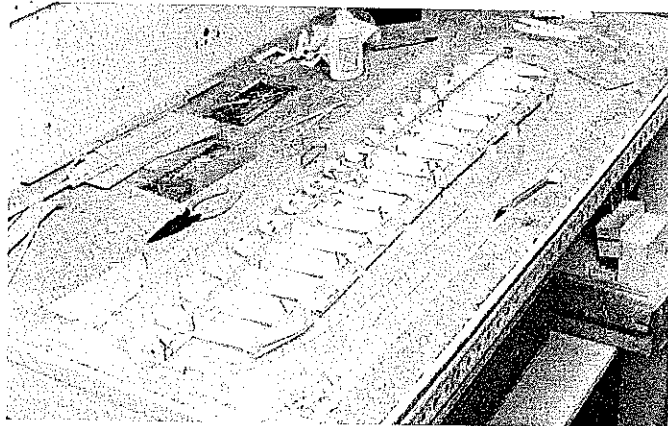
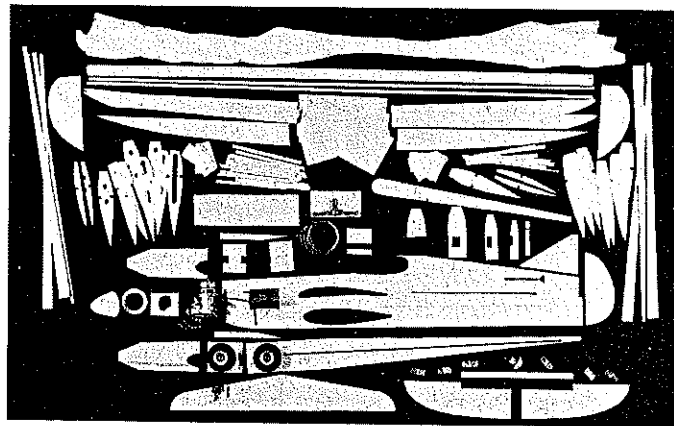


The Mandarin with its wheel pants, spinner, raked windshield, and competition markings has that zippy 1930s racer look. Designed to give you something other than a profile to mount that .15 engine on, this model fills a void that exists for full-fuselage planes of this size.

James A. Ruggiero

477

Mandarin



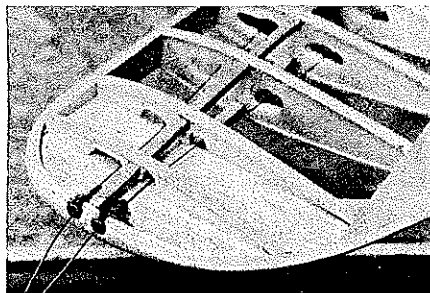
Left: All the parts laid out for assembly. Author used plastic meat trays as his source for wing ribs. Right: Wing construction before leading edge and tip installation. Note wedges under the trailing edge and the 1/8-in. spacer under spar at the tip. All photos taken by the author.

THIS AIRPLANE was designed to fill the need for a full-fuselage, stuntable Control Line model for .15-size engines. With the exception of Top Flite's Junior Nobler, there aren't any! This is a puzzle, because the .15 engine is so popular internationally, but it has never really caught on here for sport CL flying. I hope the Mandarin will help change that. It has the zippy looks of a Thirties racer, a "real" fuselage (profile fuselages tend to give CL models that "toy" look) and enough wing area to do some

stunting. It should serve as a "step up" model for anyone who has built a few kits with profile fuselages and is ready for something more challenging—but who isn't ready for a bigger, more costly engine and model.

Notable features of this model include some leading edge sweepback for appearance and yaw reduction in maneuvers. The major wing ribs (W1) are stack-cut to the same size, making wing construction easier. Wing tips are laminated from three

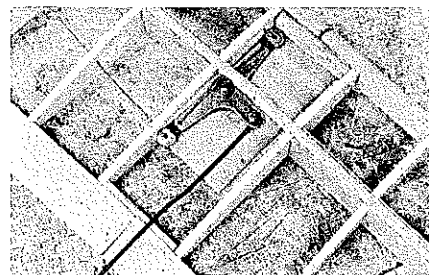
layers of soft 1/16 balsa for simplicity and strength. Simple fixed flaps give the wing an attractive semi-elliptical shape. Best of all, most of the wing builds flat on the workbench with no special jigs. The fuselage is a simple box with its bottom parallel to the thrust line for easy assembly and alignment. Tail assembly, landing gear, engine and tank installation, covering, and finishing use standard techniques. Despite its simple construction, there are enough curves to lift this design out of the boxy



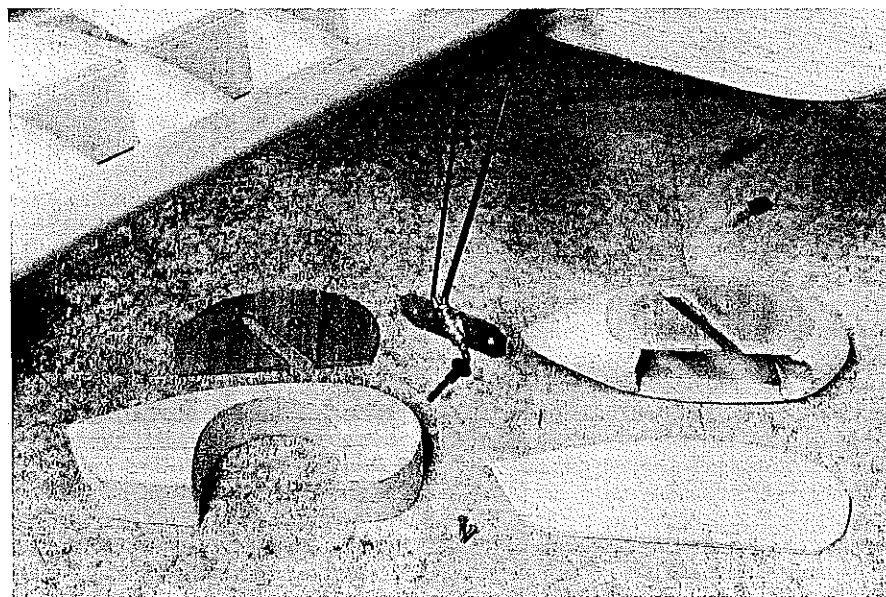
Left wing tip showing the lead-out guides that can be made from either brass eyelets or tubing. Note how tip laminations wrap around from leading edge to trailing edge.



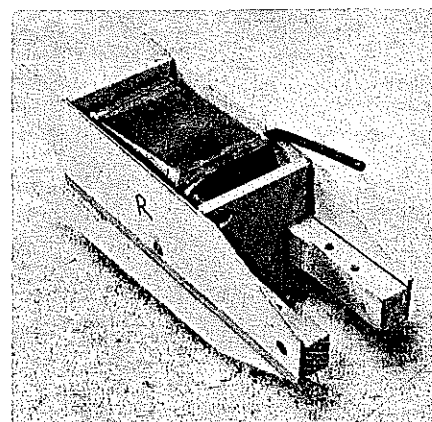
Right wing tip showing bolts used for weight. Cap strips on all the ribs cross over the spar.



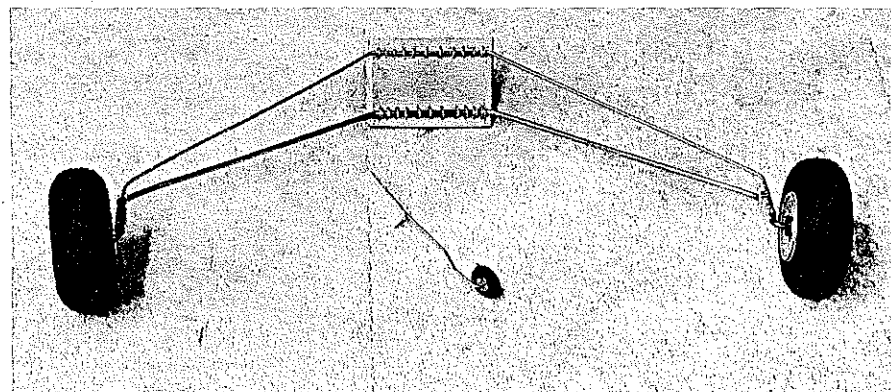
Bellcrank installed with 6-32 screw. Note the lead-out cable threaded in one length through bushed holes, then bound with copper wire. The pushrod is attached to the bellcrank with brass washers soldered to the rod.



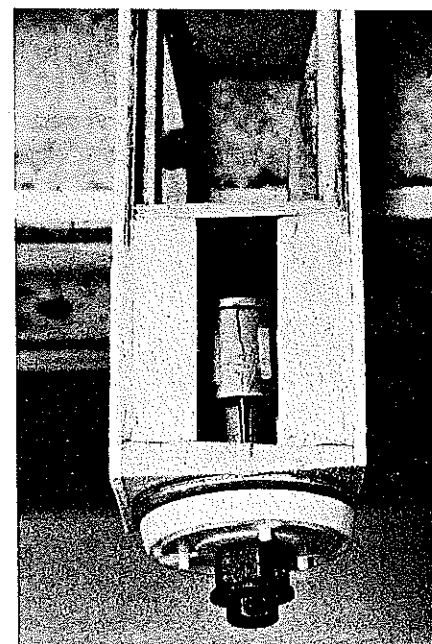
One completed wheel pant and the parts for the other. The mounting bracket is first soldered to the strut, and the wheel pant is then fastened to it using 2-56 screws and blind nuts in the plywood inner face. Author used soldered rivets to retain wheels on the axles.



Engine-tank box. Wood screws secure the ply sides to the engine bearers. Hole in the firewall is for the fuel line. Engine out-thrust (for line tension) has been cut into bearers.



Above: Soldered copper wire binding and lacing are used to construct and mount the landing gear. Tail wheel strut is bound to hardwood with thread, then cemented into the fuselage. Right: Bottom view of the engine bay with Former A glued to scrap balsa filler. Cover this area with 3/32 cross-grained balsa, and carve and sand it to fair in to the spinner shape.



category.

Construction. Gather up the materials, and let's get to work. You'll need:

Two 3/32 x 4 x 36 medium balsa (fuselage sides and bottom, wing tips).

Two 1/8 x 3 x 36 medium balsa (tail assembly, flaps, Formers D-I, fuselage top, wheel pant outer faces).

Two 3/16 sq. x 36 hard balsa (wing spars).

Two 1/16 x 4 x 36 medium balsa (wing trailing edge, cap strips, tip laminations, spar webs, center section planking).

Two 1/16 x 3 x 36 medium balsa—or one 1/16 x 4 x 36 (wing ribs).

One 1/2 x 3/4 x 36 balsa leading edge stock.

1/2-in. Balsa scrap (wheel pants).

One 1/8 x 6 x 12 plywood (bellcrank mount, wheel pant mounts, landing gear mount, Formers B and C, elevator joiner).

One 1/16 x 6 x 12 plywood (Former A, wing rib templates, engine tank box, wing tip weight support).

Two 3/8 x 1/2 x 5 maple (engine mounts).

Two 2-in. wheels and one 1/2-in. wheel.

One .045-in. music wire scrap (tail wheel strut).

One 1/16 x 36 music wire (rear landing gear strut, pushrod).

One 3/32 x 36 music wire—or Sig aluminum landing gear blank (front landing gear strut).

One .030-in. x 4-ft. cable (lead-outs).

.010-in. Acetate (windshield).

Solder, thin copper wire, .025-in. brass (landing gear).

3-in. Bellcrank, Du-Bro #106 clevis, 6-32 screw and nuts.

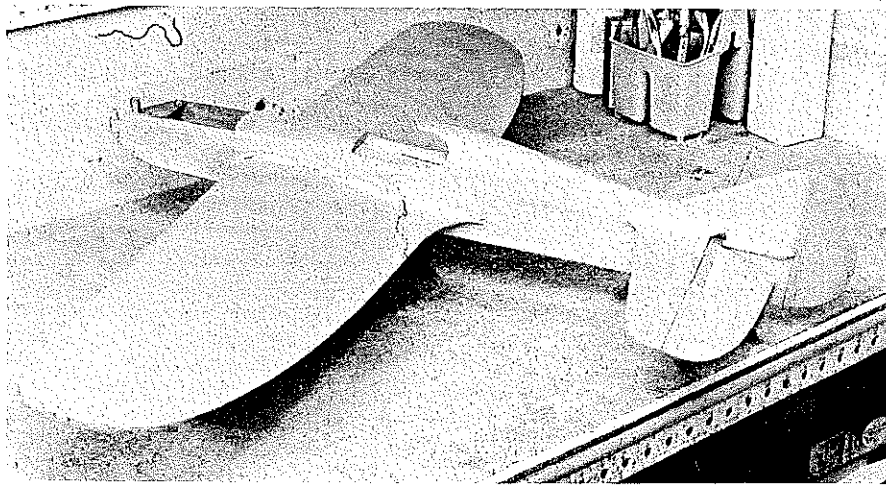
Four 4-40 screws and blind mounting nuts (engine mounting).

Epoxy, cyanoacrylate (CyA) glue, Tite-bond.

Covering and finishing materials.

First, cut out all the parts. I find it easy to put the balsa under the plan, use a pin to prick the part outline into the balsa, then "just follow the dots" when cutting out the parts. Put the parts into an old kit box (that way, you can pretend you are building an expensive kit).

Wing. Make 1/16 plywood patterns for the



Completed model ready for painting and installing the windshield. Our author chose to cover the prototype model with Mlcafilm, since this material lends itself to easy painting.

ribs. Cut all the ribs to shape, then stack them together to cut the spar notches with a thin hobby saw. With care, you can cut out all the ribs from one sheet of 1/16 x 4 x 36 balsa. I cheated a bit and cut all my ribs from foam plastic meat tray bottoms. This stuff is about 1/8 in. thick, easy to cut, and doesn't tend to shatter in a crash like balsa. But it won't take much heat when shrinking the covering, so the 1/16-in. cap strips are mandatory. Cap strips also make the ribs stronger and support the covering better. Cut the spar webs oversize and trim them later for a good fit.

Before you start gluing the wing pieces, be sure to note that the left panel (the one that's on the inside of the flight circle) is 1/8 in. longer than the right one. This difference in length compensates for the difference in lift caused by the outer panel flying faster than the inner panel.

Cover the plans with Saran Wrap. Crack both 3/16 spars, and cement at the angle shown. Pin the lower spar securely to the plan, and block up the tip only about 1/8 in. Glue the W1 ribs to this spar. Make sure they are all lined up parallel to the thrust line, standing up straight (check this with a small drafting triangle—or even a reject 35mm color slide mount), and that the trailing edges of all the ribs line up. Check this by sighting down the row, pushing any

wayward rib into alignment before gluing. Glue in the W2 ribs.

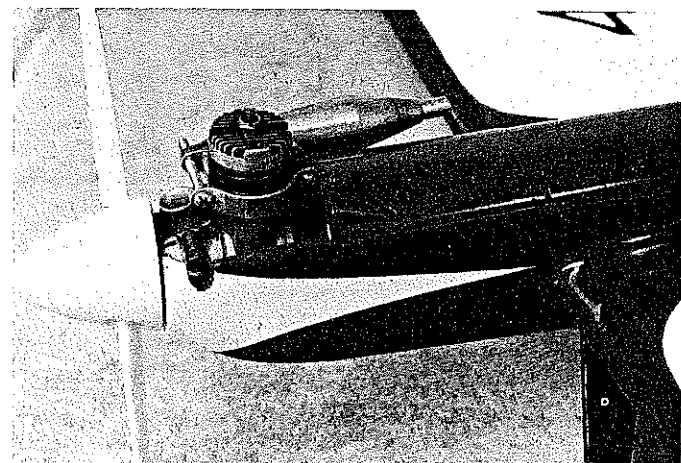
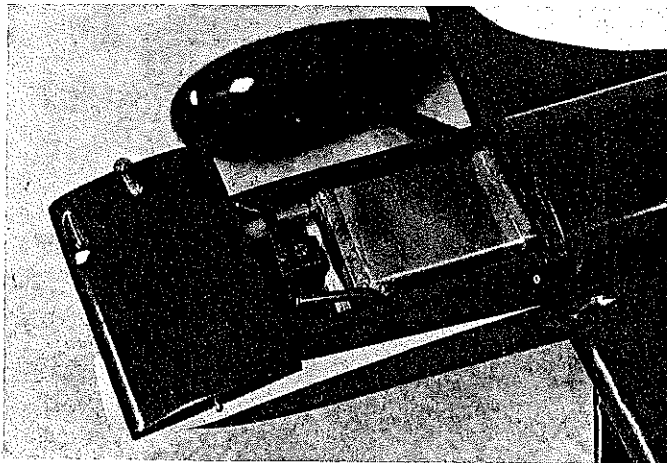
Trial-fit the top spar. Rather than force-fitting it, open up the spar notches in the ribs until the spar fits easily. Make sure the trailing edge tips of the ribs still line up. Now, glue the top spar. You will have to hold the tips of the upper spar down about 1/8 in. using large T-pins so that the spar can be properly fitted to Ribs W2.

Installing the lower trailing edge will be a bit tricky. First, glue the two bottoms together using a 3/32-in. splice at the center, then make some scrap wedges to hold the trailing edge very lightly in place on the ribs without upsetting the alignment of the rib trailing edge tips. Now, glue on the lower trailing edge, but *don't* glue W2 to the trailing edge just yet. Glue the top trailing edge, being sure to use plenty of glue at the splice.

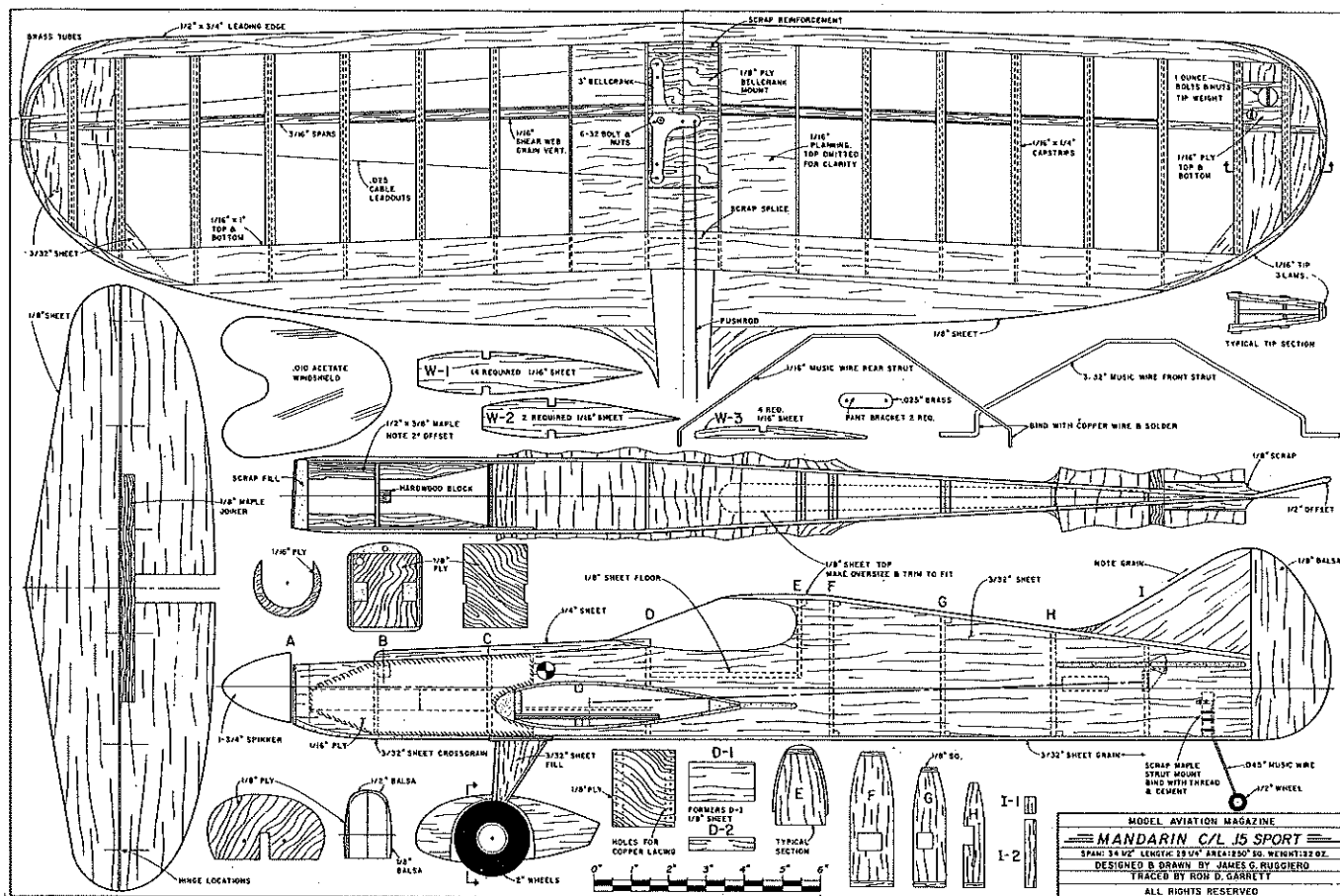
Cut the spar webbing to fit, and glue in place. Don't omit these pieces, as they add considerable strength that is needed for high-stress maneuvers.

Check the wing for warps by stepping back a few paces and sighting forward from the trailing edge toward the spars. You should see the trailing edge follow the spars in parallel alignment along the entire span.

Remove the wing from the plan. Crack the leading edge at the center by making a



Left: To secure the hatch, a toothpick pin in the back engages a hole in the top deck, and a nylon screw threads into the hardwood block behind Former B. Right: The author's 1958-vintage Fox .15 provides the motivation. Don't forget clearance holes for needle valve and vent.



saw cut, then bend carefully and cement. Line up the leading edge with the ribs, using a few pins to hold it in place while you check. Use the technique shown in an article by Larry Kruse in the September 1984 *Model Aviation* of putting craft sticks behind the spars every few inches, then looping a rubberband from one end of the stick around the leading edge, and attach the other end of the rubberband to the other end of the stick. This holds the leading edge in place better than pins. Glue on the leading edge—and don't forget the splice at the center.

Glue the 1/8 ply bellcrank mount, and add balsa scrap reinforcement along the W1 ribs. Use epoxy here.

Glue on the 3/32-in. tip plates. Be sure they line up on the centerline of the W2 ribs

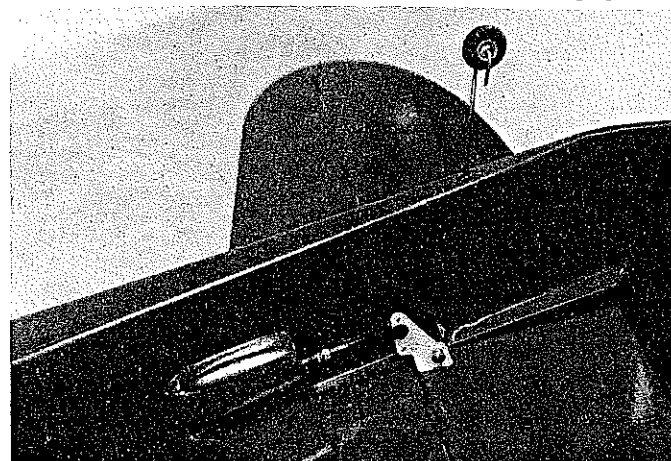
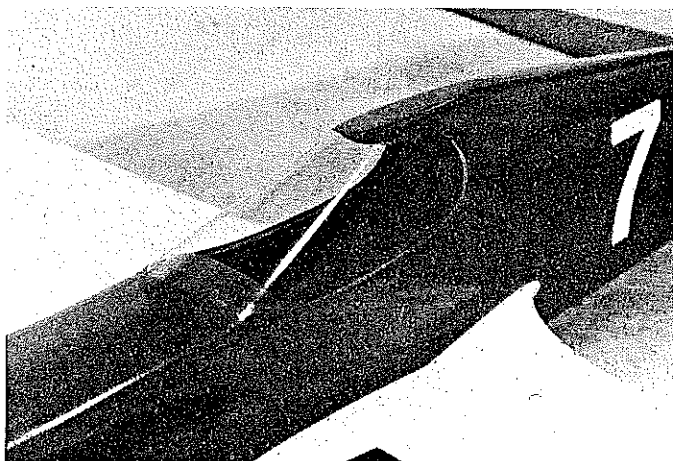
and also on the center of the leading edge. Glue the W3 ribs to the tip plates and leading edge. Glue the top and bottom trailing edge pieces to both W2 and the tip plate. Glue the ends of the spars down to the tip plates. When this is dry, sand the curve of the tip smooth, starting at the leading edge and working around to the trailing edge. To complete the tips, wrap three layers of 1/16 balsa around the tip plate, starting at the leading edge and ending at the trailing edge. CyA glue works well here. See the tip section on the plans for the proper contour. Add lead-out guide tubing to the left tip, and scrap ply and bolts for tip weight on the right. Use CyA glue to lock the nuts and bolts.

Controls. Drill a hole in the bellcrank

mount for a 6-32 bellcrank pivot bolt. Fasten the lead-outs to the bellcrank (I used a continuous length of cable threaded through holes in the bellcrank and fastened with thin copper wire). Make up a short pushrod length with a Z-bend to fit the bellcrank, or solder on brass washers to fasten the pushrod to the bellcrank.

Thread the lead-outs through the holes in the ribs and through the lead-out guides, then make up loops at the ends for your line clips. Check for smoothness of operation, then add the 1/16 sheet planking to the top and bottom of the center section. Glue on the cap strips (you'll notice that the center section planking and the cap strips are glued over the spars). Sand the wing smooth, and put it aside. Flaps will be added later.

Continued on page 78



Left: .010 acetate windshield is attached with epoxy, filled, and sanded to fair into the fuselage. Right: Threaded clevis allows fine adjustment of neutral elevator and permits 45° of up and down movement. Shroud on pushrod exit (not shown on plans) keeps out exhaust gunk.

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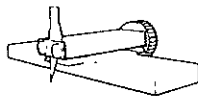
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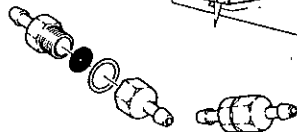
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Engine and tank mount. This is made as a "box" consisting of the engine beam mounts and Formers B and C. Before making this assembly, be sure to measure how much room you will need for your tank. You may need to move Former C back a bit farther to accommodate a long tank; there is about 1/8 in. space between Former C and the wing, as shown on the plans. If you want to make your tank removable, you can use the toothpick and screw hatch hold-down, plus some scrap fuel line tubing wedged between the tank and the fuselage sides.

Cut the two box sides from 1/16 ply, and mark the position of the engine bearers on each. These lines should be parallel to the bottom edges of the box sides. Make a right and a left side. Drill holes in the bearers for your engine, and be sure to include the offset thrust as shown on the plans. Insert 4-40 blind nuts, then epoxy the bearers to the sides; use wood screws, also. Epoxy Formers B and C. Check the fit of your tank. Drill holes for the fuel feed tubing through Former B and also through an engine bearer for the tank vent.

Fuselage. Cut the sides, and mark them on the inside for all the formers and the engine and tank box. You will also want to draw a line on the outside of each fuselage side for the centerline of each flap so that you can line them up for later assembly. Cut the pushrod exit in the right side. Slide the fuselage sides onto the wings—but don't glue yet.

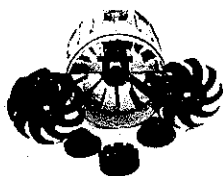
Temporarily slide the stabilizer in place. Make any necessary bends in the clevis wire so it can exit smoothly from the fuselage, and temporarily fit the split sleeve over both the clevis wire and the short length of pushrod from the wing. Ideally, with the pushrod end and the clevis wire end touching each other, the clevis pin should just reach the hinge line of the stabilizer when the controls are set to neutral and the clevis is threaded about halfway onto the clevis wire. Make adjustments as needed, then solder the pushrod and clevis wire into the sleeve. Remove the clevis, and slip a piece of fuel tubing over the threaded wire to protect it from glue and paint.

With the wing and stabilizer still temporarily in place, set the fuselage down on the workbench and proceed to glue Formers D through I, but don't glue the wing yet; you will want to move the wing around for perfect alignment when the fuselage is more rigid. Use masking tape while you CyA-glu the upper fuselage sides to the curved portions of the formers.

Taper the inside ends of the fuselage sides to about 1/16-in. thickness at the rudder post, then glue the ends together. Remove the stabilizer. Make the 1/8-in. fuselage turtledeck a bit oversized (see the dotted outline on the plan top view), and make score marks on the inside of the turtledeck where it bends over Former F, then bend to fit, and glue it to the fuselage.

Continued on page 166

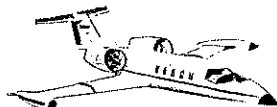
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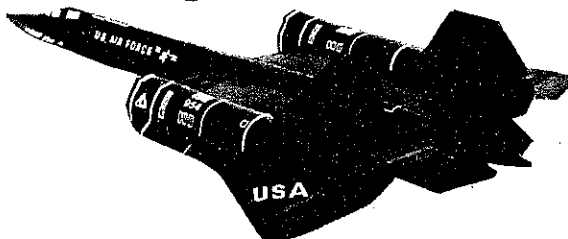
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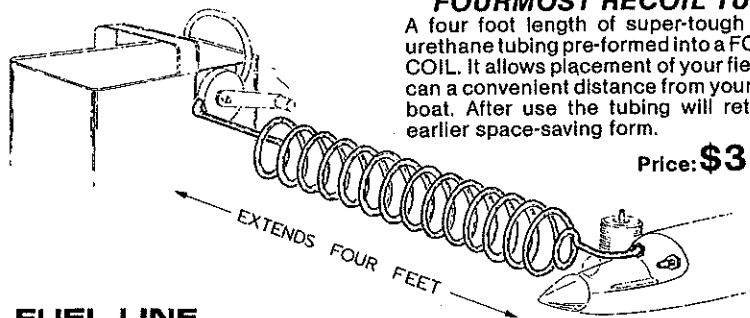
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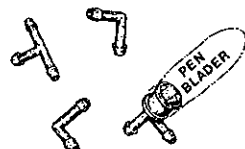


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As always, your comments are solicited and appreciated.

John C. Ballard, 10102 Kimblewick Dr., Louisville, KY 40223.

CL Speed/Hempel

Continued from page 73

ing model builder is from Hobbyoxy: a new product introduced as the best grain-filler you'll ever use. It's called Fast Fill, because it dries fast, sands fast, and fills fast. It's a single-component, air-dry material, which means you don't mix two parts together. Just open the can, and it's ready to use. Stir it up, add a little thinner

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Fast Fill is compatible with most hobby paints, including dopes, enamels, urethanes and epoxies. It's at your local hobby shop now, so go get some.

For free information on their entire line of finishing materials, write to Hobbyoxy Products, Division of Pettit Paint Company, Inc., 36 Pine Street, PO Box 378, Rockaway, NJ 07866.

At the recent Hobby Industry Association Show, I noticed a new set of flying lines from Sullivan Products. These lines are made from Kevlar 29, with properties similar to those used in electromechanical cables, cordage, ballistic fabrics, sewing thread, parachutes, webbing, and sailcloth. Kevlar is the registered trademark for one of DuPont's high-temperature-

resistant aramid fibers, with a unique combination of toughness, extra-high tenacity, and modulus.

These lines were developed to be stronger than .018 stainless steel cable (or anything smaller). Sullivan recommends using the Kevlar lines in place of .018 or smaller cable. They do not recommend tying knots into these lines. Also, they will not bend, kink, or resonate.

The engineering tests were conducted by the University of Maryland on an Instron Universal Testing Machine. Obviously, test data can vary from sample to sample, but the figures indicate a considerable increase in strength over steel lines. Also, the price is right. Mail a SASE to Sullivan Products, PO Box 5166, One North Haven Street, Baltimore, MD 21224 for more information.

$\frac{1}{2}$ A engine parts. Many modelers have written to find out where one can locate blank Cox .049 cylinders. I have these available, plus many other Cox .049 engine parts. Also, I have the new case with chrome shaft setup. For more information, send a SASE to P&G Metal Shop, C/O Gene Hempel at the address given below.

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Gene Hempel, 301 N. Yale Dr., Garland, TX 75042.

Mandarin/Ruggiero

Continued from page 78

Sand this to a smooth, round section.

Align the wing and fuselage, then epoxy thoroughly, being sure to work plenty of epoxy into the joints. Reinforce the inside of the wing-fuselage joint with fiberglass tape and scrap balsa. Be sure that the left wing panel is $\frac{1}{8}$ in. longer than the right one. Glue in the $\frac{1}{8}$ -in. cockpit floor.

Glue the fixed flaps in place, being sure

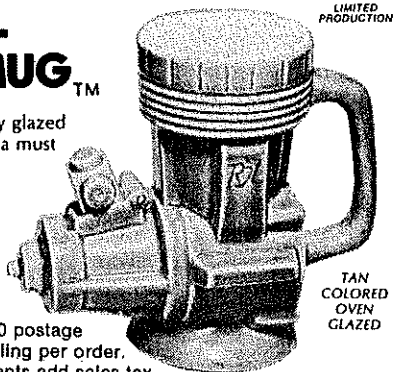
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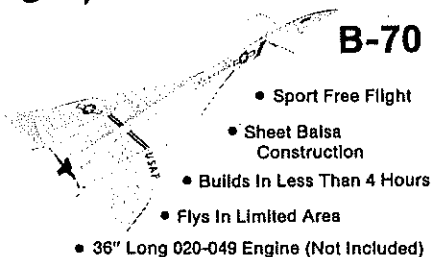
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