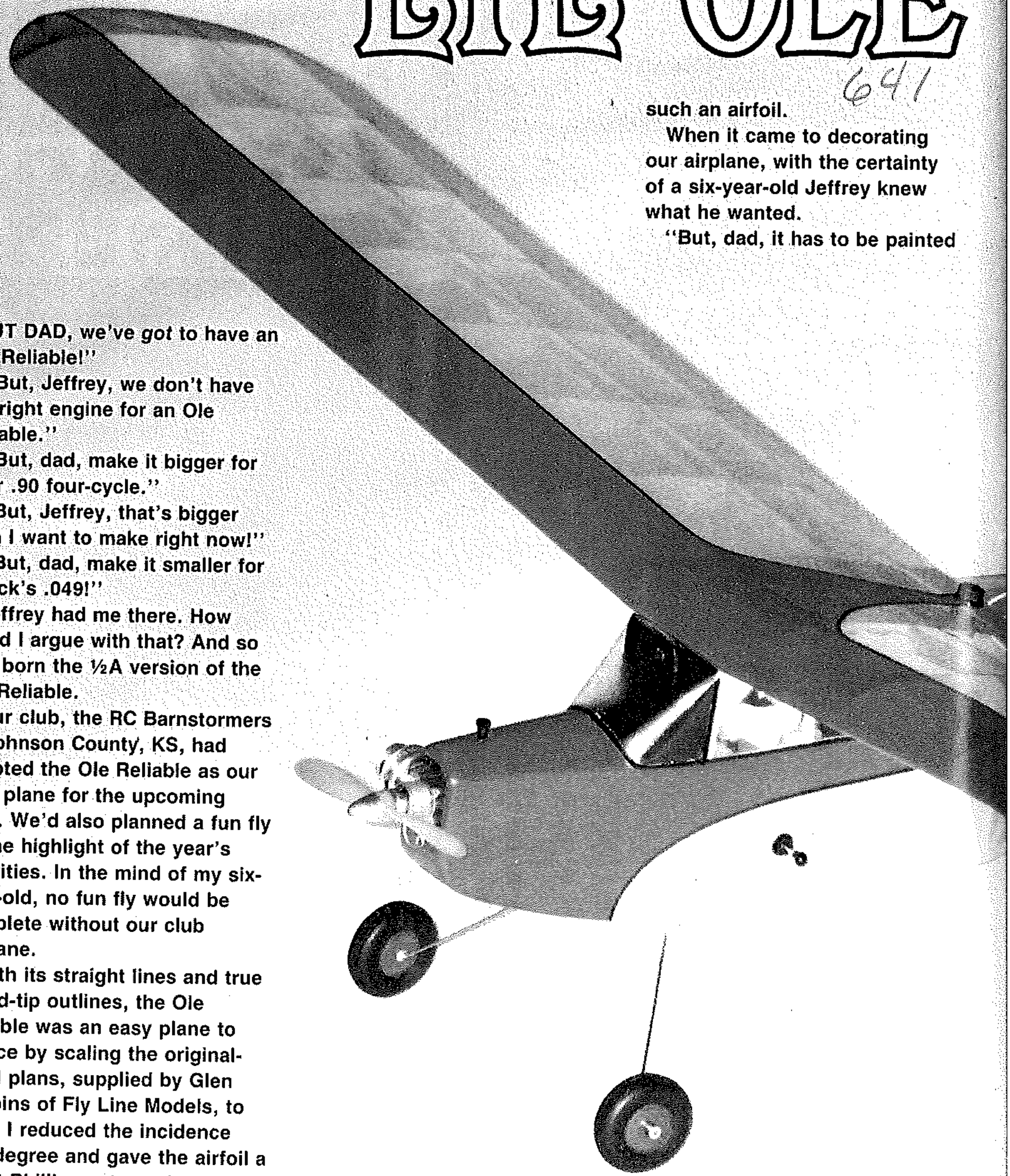
LIL' OLE



"BUT DAD, we've *got* to have an Ole Reliable!"

"But, Jeffrey, we don't have the right engine for an Ole Reliable."

"But, dad, make it bigger for your .90 four-cycle."

"But, Jeffrey, that's bigger than I want to make right now!"

"But, dad, make it smaller for Chuck's .049!"

Jeffrey had me there. How could I argue with that? And so was born the ½A version of the Ole Reliable.

Our club, the RC Barnstormers of Johnson County, KS, had adopted the Ole Reliable as our club plane for the upcoming year. We'd also planned a fun fly as the highlight of the year's activities. In the mind of my six-year-old, no fun fly would be complete without our club airplane.

With its straight lines and true round-tip outlines, the Ole Reliable was an easy plane to reduce by scaling the original-sized plans, supplied by Glen Dobbins of Fly Line Models, to 70%. I reduced the incidence one degree and gave the airfoil a slight Phillips entry to improve penetration. I also increased the tail moment by an inch for extra stability, and changed the top of the nose from a square cross section to a more rounded section for better appearance. The flat stabilizer section on the original plane was given a lifting diamond airfoil for better handling in windy conditions. I learned later that the full-size model had also incorporated such an airfoil.

When it came to decorating our airplane, with the certainty of a six-year-old Jeffrey knew what he wanted.

"But, dad, it has to be painted like this one!" He was pointing to a Goldberg Comet Jr. Clipper +35% in the July 1986 *Model Aviation*.

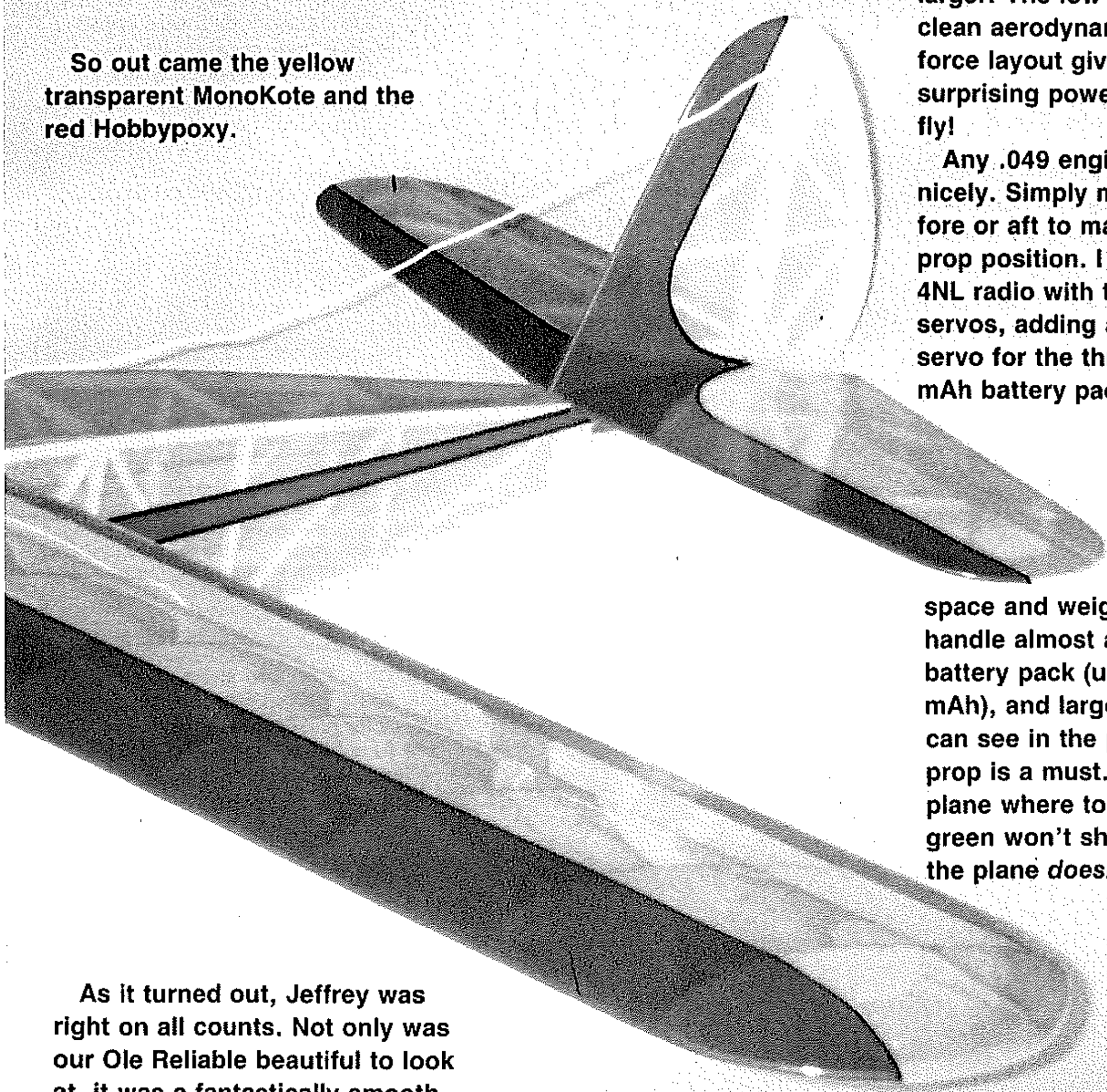
"But, Jeffrey!"

"But no buts, dad!"

RELIABLE

Redesigned from an original 1938 model by Charles Marcy of Syracuse, NY, this 50-in.-span plane has been modified for modern .049 power and RC. Easier to build, the updated airplane also has improved flight characteristics and appearance. ■Norman I. Pfeifer

So out came the yellow transparent MonoKote and the red Hobbypoxy.



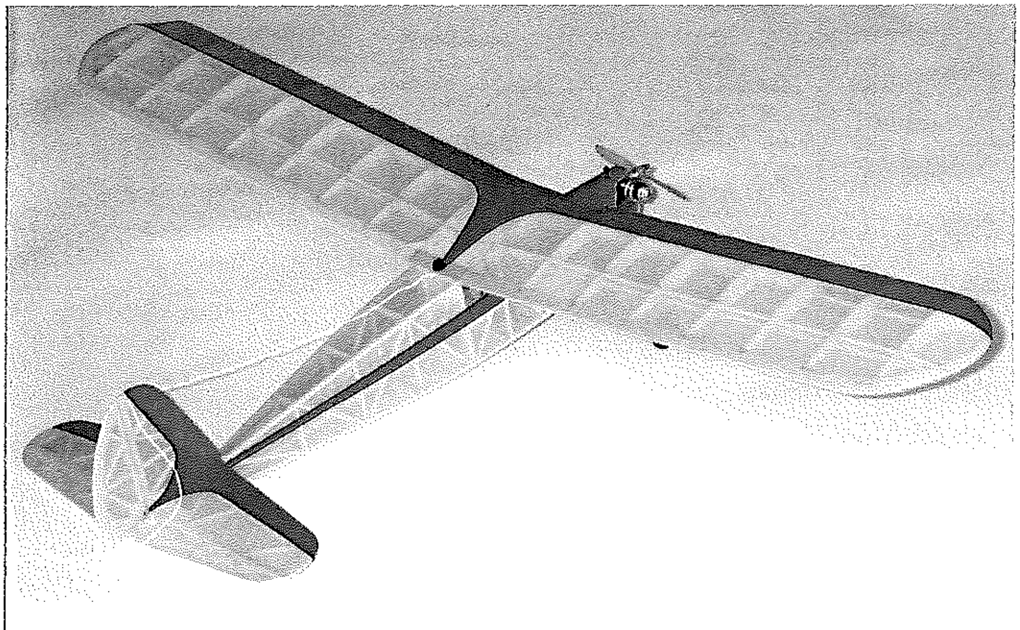
Lil' Ole Reliable ready to go. It's been scaled down to 70% from plans of the original Ole Reliable supplied by Glen Dobbins of Fly Line Models. It's also been modernized and simplified for today's building methods and RC gear.

As it turned out, Jeffrey was right on all counts. Not only was our Ole Reliable beautiful to look at, it was a fantastically smooth and stable flier that executed nice, predictable maneuvers. Several of the club members who had the bigger Ole Reliable said it flew even better than their ships. It was a great plane for Jeffrey to learn to fly.

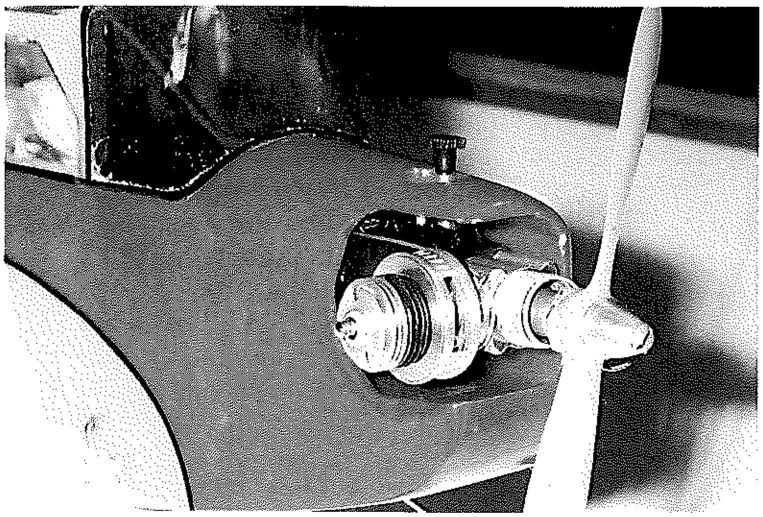
Compared to past experience in ½A Pylon aircraft, the Lil' Ole Reliable appeared a great deal larger. The low wing loading, clean aerodynamics, and good force layout give this machine surprising power. And does it fly!

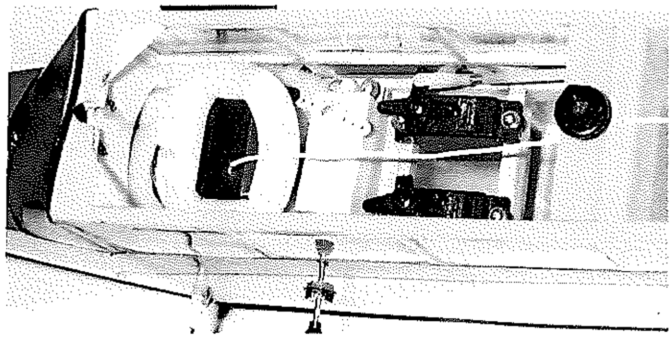
Any .049 engine will work nicely. Simply move the firewall fore or aft to maintain the same prop position. I used a Futaba 4NL radio with two 5-33 mini servos, adding an old World S-10 servo for the throttle and a 250-mAh battery pack. There is space and weight tolerance to handle almost any size receiver, battery pack (up to even 500 mAh), and larger servos. As you can see in the photos, a green prop is a must. First, it tells the plane where to go. Second, green won't show grass stains if the plane *doesn't* go!

Construction is very straightforward. The basic materials are ⅛-in.-sq. sticks, ⅛ x 3/16-in. sheeting, Lite Ply, and 1/16 plywood. Rather than explaining the building sequence in detail, what follows is a



Simple and lightweight stick-and-truss framework is much stronger for its weight than solid sheet. Lightweight planes don't have mass inertia crash potential—they're better bouncers. Covering is transparent yellow MonoKote, and red accents are done with Hobbypoxy paint.





Left: The Cox Dragonfly .049 engine shown was chosen because it has a throttle for slowing down the engine. This gives better control, especially for beginners. Side mounting prevents flooding while starting and keeps the exhaust away from the air intake. The firewall must be moved forward if a Black Widow or QRC engine is used. Above: The servos and receiver must be installed well forward and high for lateral and vertical center-of-gravity requirements. Microservos are used here, but there's room for standard servos.

description of interesting points.

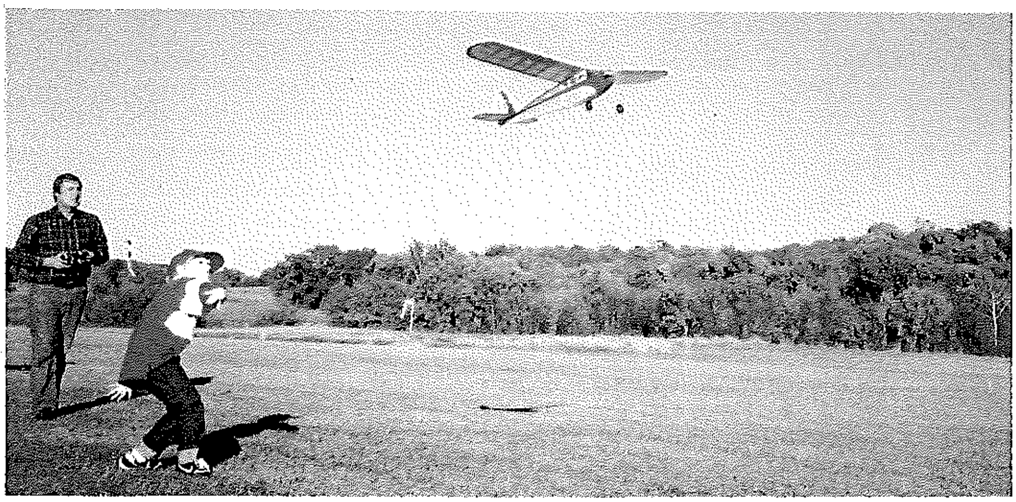
The project involves a good many open-ended wood joints. The best way to accurately and smoothly shape these joints is with a mitre sanding block such as the one made by Fourmost Products. An open-ended joint is best secured by first placing a drop of CyA (cyanoacrylate) glue on the end grain to penetrate and seal the wood. After letting that cure for a minute or so, position the pieces and add another drop of thin CyA, followed by a drop of thick CyA.

I suggest making a jig for cutting out the identical ribs. Cut and shape a master rib from 1/16 ply. Check all notches for correct fit where they join the spars and leading edge.

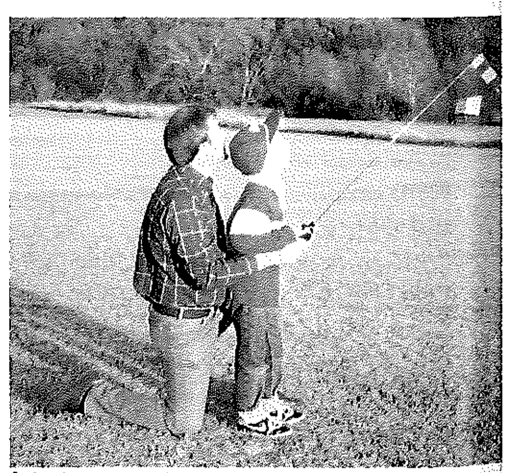
Set this pattern on top of a piece of 1/2-in. particle board. Drill two 1/16 holes, one hole toward the leading edge and the other three-fourths of the way back toward the trailing edge, through the pattern and the particle board. Place a large upholstery tack in each hole, and CyA each tack to the pattern only. Push a straight pin through the pattern about 1/8 in. from the trailing edge and to a depth of about 1/32 in. beyond the jig. Bend over the shank of the pin, and CyA it to the ply pattern.

Set the pattern over a balsa rib blank, and seat the tack points into the jig holes of the particle board. Trace around the pattern using a No. 11 blade in your X-Acto knife. After just a few cuttings, you'll have etched a groove in the particle board for the blade to accurately follow in subsequent cuttings.

Wing. A hinged building board simplifies construction. I use two pieces of 1/2 x 36 x 12-in. particle board with two 3-in. door hinges in the middle. This is covered with a 2 x 4-ft. piece of acoustical ceiling tile. Prop up each end of the board to give the proper dihedral angle, and build the entire wing in one piece.



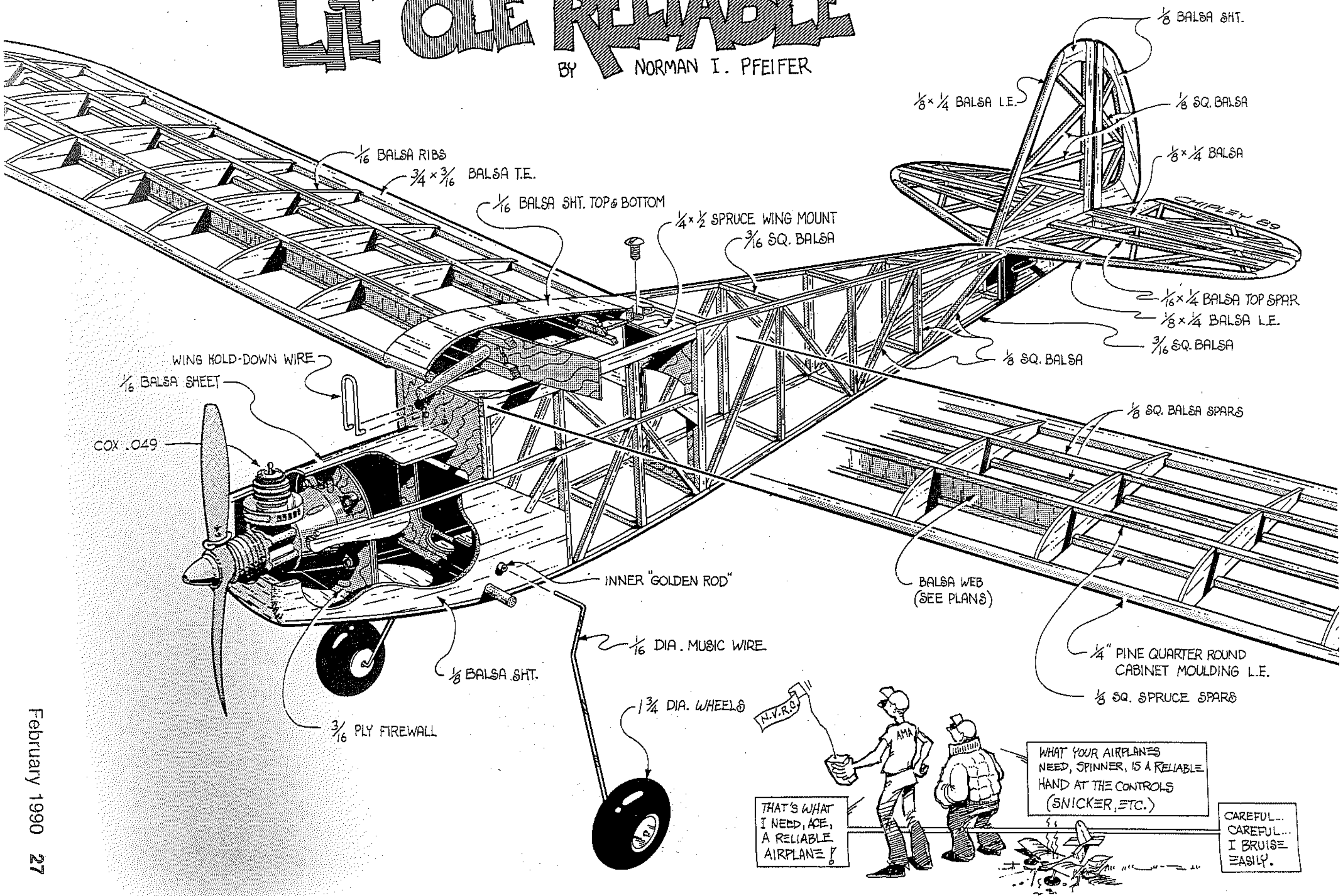
The author's son, Jeffrey, launching Lil' Ole Reliable. The airplane is extremely stable and will fly immediately upon launch. It can be hand launched or ROGed from a smooth surface.

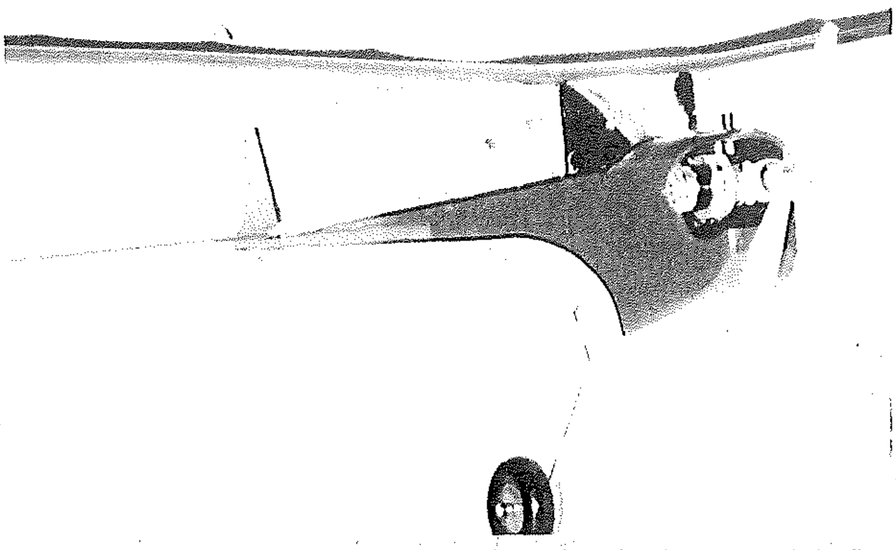


A testament to how easy the airplane is to fly. The author is seen here coaching his son Jeffrey on the intricacies of RC flight. What a great way to get the youngsters interested.

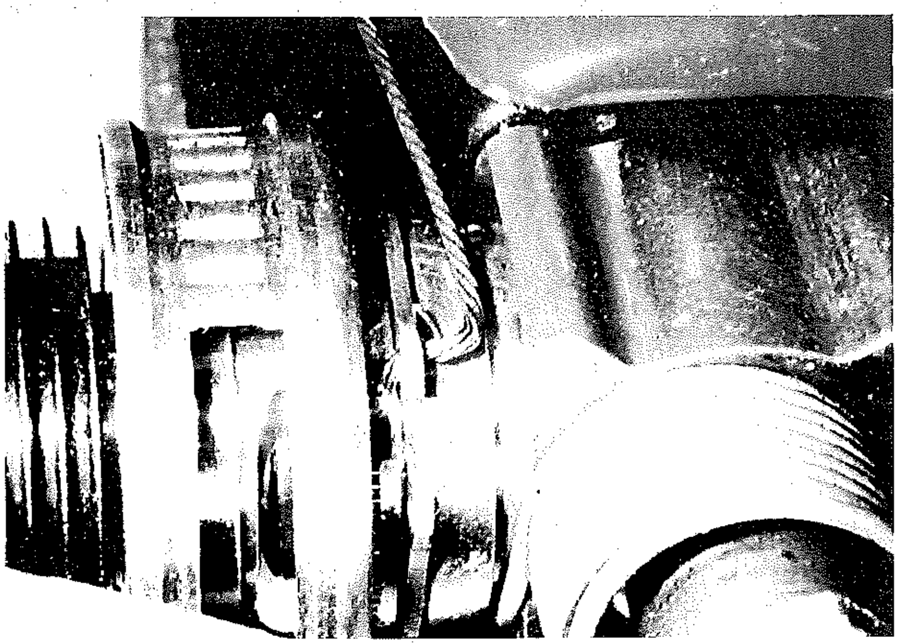
LI'L OLE RELIABLE

BY NORMAN I. PFEIFER

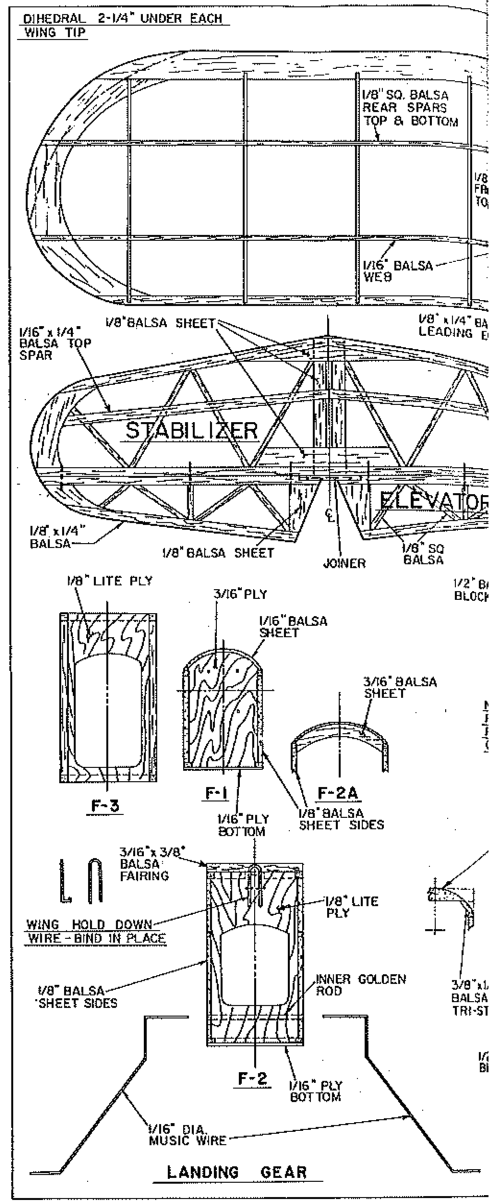




The simple, straight lines of this model have proved very airworthy. Note the plug-in landing gear held in place with shock-absorbing rubberbands. This is all part of the "bounce" factor.



Close-up view of the simple but effective throttle control system on the Cox Dragonfly engine. The solder-stiffened cable end with a Z-bend makes a simple and effective connector.



Cut out the wing parts (ribs, tips, dihedral brace, gussets, and webbing sheets). The trailing edge notches are easily made with two hacksaw blades clamped together.

Adjust and pin the tips, trailing edge, center flat rear planking, and bottom spars over the plans, then position and CyA the ribs and $\frac{1}{16}$ ply dihedral brace in place. Fit in the vertical-grained spar webs, making sure they're accurately positioned with no gaps, then CyA in place. Note the diminishing web thickness toward the tip. Anytime a solid structure ends abruptly, stress will be concentrated at that point and can result in a fracture. By progressively dispersing the stress, that problem is prevented.

Trim the webbing height, and CyA the top spars into place.

I like to use $\frac{1}{4}$-in. quarter-round cabinet molding from the local lumberyard for the leading edge. Not only is this molding very strong, not too heavy, and dent proof, but the leading edge radius is already formed for you. A slight trimming of the lower contour is required after it is CyAed in place.

Remove the wing from the building board. Add the bottom front sheeting, $\frac{3}{16}$ dowel support block, and center $\frac{3}{16}$ gussets. Drill a $\frac{1}{4}$-in. hole through the dowel support block just under and behind the leading edge, angling up through the webbing just above the $\frac{1}{8}$-in. spruce bottom spar for the wing hold-down dowel.

Fit the $\frac{1}{4}$-in. dowel, but don't glue it at this point. It will be epoxied in later after trial fitting to the fuselage and sanding the wing; it's much easier to sand and shape the wing without a dowel sticking out. Fit and CyA the top center planking.

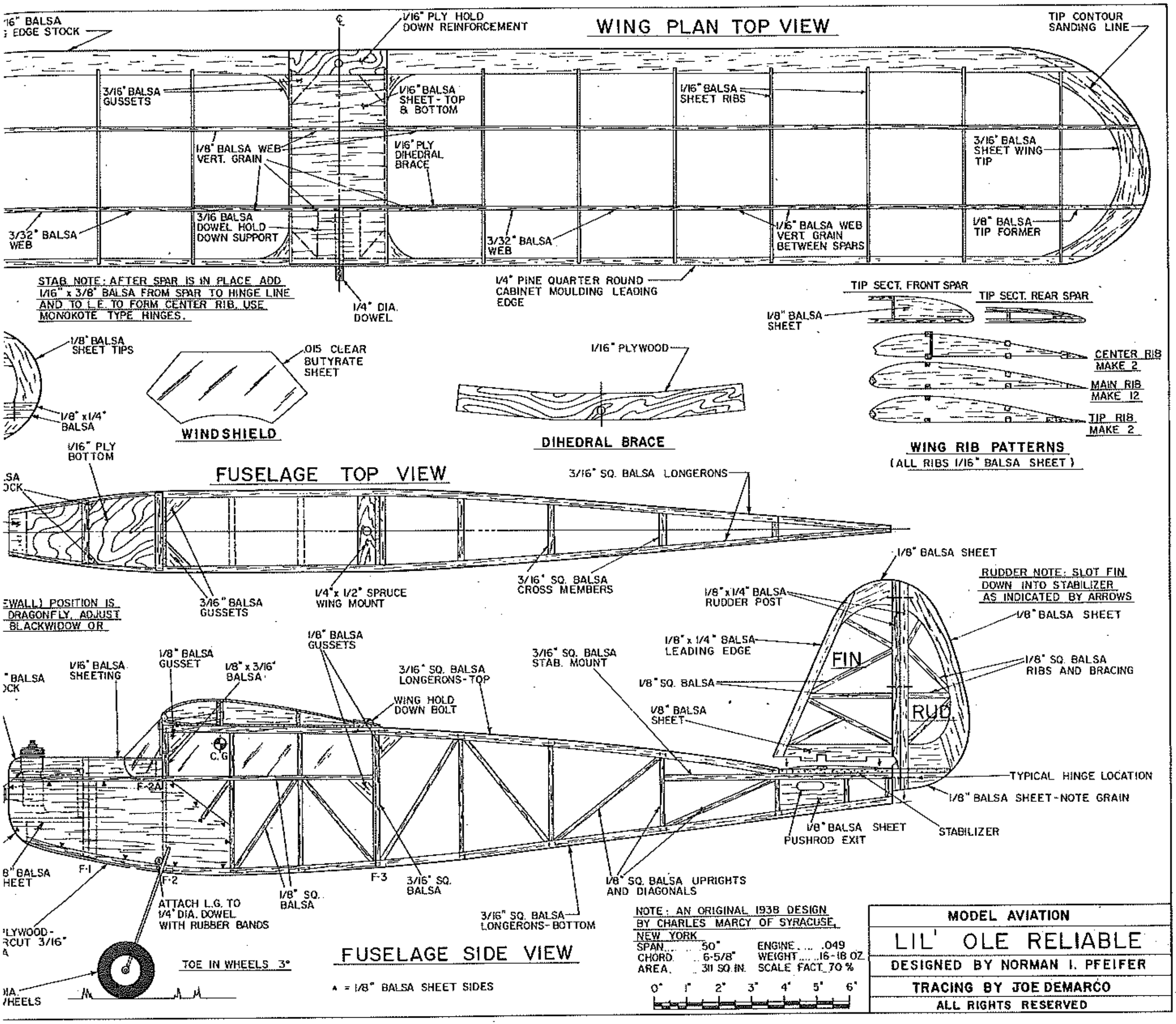
Block sand the wing, and shape the tips. Following the sanding contour line shown on the plans, the tips are half-rounded forward of the front spar to match the leading edge. Behind the front spar, progressively contour them to the thickness of the trailing edge.

Stabilizer and fin/rudder. Cut out the $\frac{1}{8}$-in. sheet tips and the rudder trailing edge and center pieces. Adjust, fit, and pin these over the plans along with the $\frac{1}{8}$ x $\frac{1}{4}$-in. leading edge, trailing edge, and hinge line spars. Add the $\frac{1}{8}$-in.-sq. balsa ribs.

Both the fin/rudder and stabilizer/elevators are built flat. Be sure to leave the $\frac{1}{8}$-in. fin slot in the center of the stabilizer. Block sand the top and bottom of the stabilizer now, since it will be more difficult later.

The most challenging part of building the stabilizer is creating the diamond-shaped lifting airfoil. The end $\frac{1}{8}$-in.-sq. rib is undercut $\frac{1}{16}$ in. where the spar passes over it. This allows the spar to be trimmed and tucked at the inside edge of the $\frac{1}{8}$-in. sheet tip, forming an airfoil that tapers into a flat tip and is easy to cover. Add $\frac{1}{16}$ x $\frac{3}{8}$-in. balsa at the center section, carrying it from in front of the spar to the leading edge and from the back edge of the spar to the hinge line. Sand these two areas evenly to create the diamond section.

Full-Size Plans Available . . . See Page 188

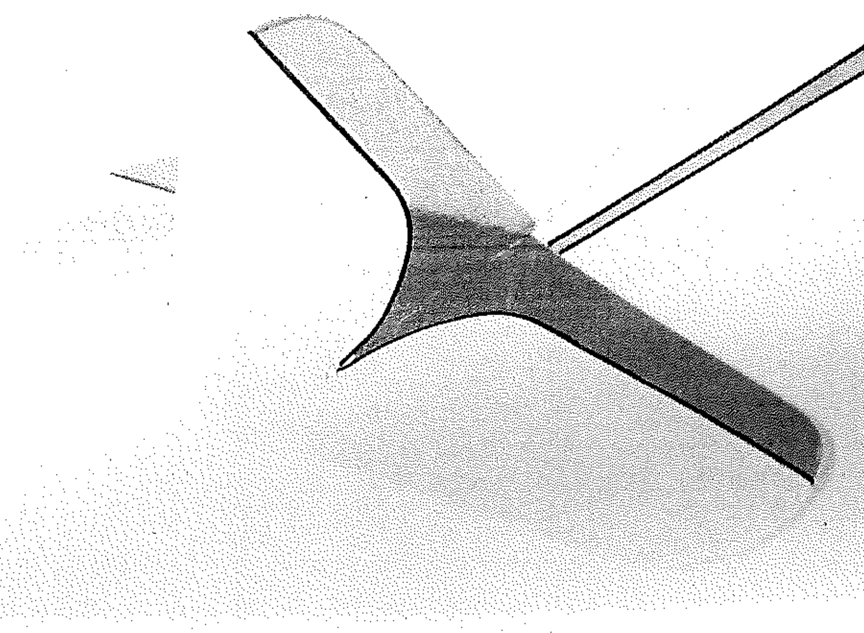


Block sand the stabilizer, elevator, and fin/rudder. When sanding the top of the stabilizer, protect the top spar from being sanded by covering it with a piece of masking tape. The spar should have a flat top section. The covering will be attached to the top spar, leading edge, and hinge line only. Stretched between these three points, it will form the desired diamond airfoil section.

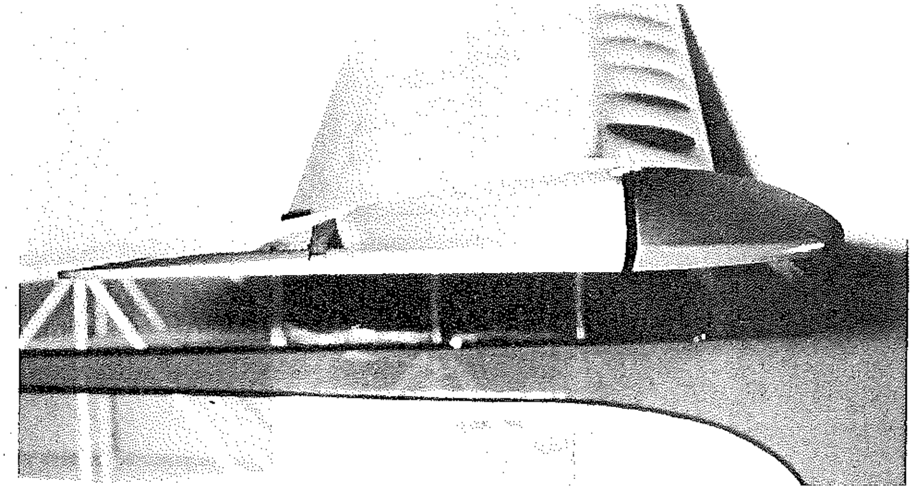
Round off the leading and tip edges of the stabilizer and fin. If a soft neutral control is desired, round the trailing edges of the rudder and elevators also. If a more definite and responsive control is desired, keep the trailing edges square and sharp.

Fuselage. Cut out the ⅛-in. sheet balsa nose section, ⅛-in. Lite Ply and balsa formers, and $\frac{3}{16}$ ply firewall. Position the engine on the firewall, aligning it with the thrust line shown on the plans. Mark and drill the mounting holes, then install the 3-48 blind mounting nuts. If you're planning to use a throttle, drill the throttle cable hole at this point.

I originally used a much lower thrust line than the one shown, but raised the engine



The tail surfaces and fuselage are covered, hinged, and painted before final assembly. Be sure to strip any covering material from the tail-joining surfaces before gluing the tail in place.



Close-up of the wing tip. The structure must be carefully contoured and sanded to blend smoothly with the half-rounded leading edge and neatly faired to blend with the trailing edge.

when I realized that with the downthrust this required, the Cox .049 would be buried in the nose, making access to the needle valve and fuel filler tubing very difficult. Why make things difficult if it can be avoided with a little pre-planning?

With the engine mounted on the firewall, set this assembly over the plans and move the engine fore and aft to determine the position you want for good prop and starter spring clearance. Mark this position on the plans by drawing a new line parallel to the firewall position shown. All of the Cox .049 engines have different lengths, so the position has to be determined by the particular one you're installing.

Pin the ⅛-in. sheet nose section over the plans, then position and pin the 3/16-sq. balsa outline, stabilizer mount, and fuselage uprights. Fit and CyA (double-CyA the end grain) all the ⅛-in.-sq. balsa pieces, gussets, and control rod exit filler. All pieces are assembled flat on the building board. The 3/16 pieces will protrude more than the shorter ones, but that's OK.

When this assembly is dry, remove the right side from the plans. Block sand the smooth side where the pieces don't protrude.

Repin the fuselage to the building board with the smooth side up, pinning it from the side just enough to hold it in place. Cover the smooth side with wax paper, then fit and CyA the left side over it, with the pieces protruding to match the right side.

When this assembly is dry, remove and block sand only the smooth outer left side. Place the right side over the plans, and mark the firewall position as previously determined with the line you drew on the plans. Transfer this mark to the left side.

Position F-2 and F-3 on one side. Using a square to ensure that they're perfectly vertical, double-CyA these pieces in place. Remember that since the plywood edges are end-grained, they require an initial application of thin CyA before final attachment to the fuselage. Position and CyA the second side on top of F-2 and F-3. Use a square to ensure accurate alignment of the tail, nose, and side pieces.

A jig works nicely for bending and aligning the remainder of the fuselage, but hand alignment is easy too. If you marked the centerlines on all the formers and the firewall, sight down the interior of the fuselage to check that they meet exactly. Pull the tail together as you sight down the centerlines, then add the 3/16-sq. crossmembers one at a time, checking the centerlines and watching for any twist as you go along. Pull the nose together, and epoxy the firewall in place.

Block sand the fuselage top and bottom. Mark the 1/16-in. bottom nose reduction, and undercut this for the 1/16 plywood bottom. Add the engine compartment floor and the half-bottom nose fairing block. Glue in the bottom 1/16 plywood.

Install the servos and pushrods at this point, while you can still reach them easily. For servo mounting, I used ⅛ x ½ x 67/16-in. Lite Ply side rails CyAed to the inside ⅛-in.-sq. pieces from F-2 to F-3, and ¼ x ⅜-in. spruce cross rails.

Install the servos, battery, and receiver as high and as far forward as possible in the fuselage. Mounting them low will lower the vertical center-of-gravity, producing a pendulum effect which harms the airplane's rolling characteristics. A lowered center-of-gravity also hits the center of lateral area and reduces spiral or spin stability. Why do all those Electric guys install their batteries in the bottom?

Wing mounting should be done at this point. Notch F-2 for dowel clearance. Bend the front wire hold-down, but not the horizontal or vertical ends, as per the plans. The scrap end of a Kwik Link makes a good hold-down wire.

Mark the horizontal bend location on the wire. With the wing in place, position the wire over the wing dowel and onto F-2. Mark the horizontal bend location onto the former, drill two 5/64 holes, and bend the horizontal portion of the wire. Reposition the wire, and check to see if the holes must be altered for a correct fit. Bend the vertical end, and slip the wire through the holes. Double-check the fit and for good capture of the dowel.

Drill 1/16 holes on each side of the wire, then lace them with soft wire. With pliers, mash the vertical ends of the wire into the back side of F-2. Add the ¼ x ½-in. spruce trailing edge hold-down block and the 1/16 ply reinforcement on the top of the wing trailing edge.

Drill and tap the wing once it's in accurate alignment. When you're satisfied with the wing alignment and the wire hold-down

Continued on page 32

Left: The author and his son prepping Lil' Ole Reliable for another flight. Jeffrey is using an Astro Flight mini electric starter (which is no longer manufactured) to start the engine—a real finger saver for young and old alike. Right: Young Jeffrey learning the art of RC aircraft maintenance.

position, apply a coat of thin CyA to penetrate, followed by thick CyA to fillet the wire in place.

Finish the top of the nose and the wing fairing block. Add F-2A and the 1/16 balsa planking. Add the triangle stock pieces (modified from 3/8-in. triangle stock) and the top 3/8-in. block. Finally, sand and shape the fuselage.

Landing Gear. The plug-in landing gear simplifies covering; I don't like to cover around bumps. The rubberbands are good shock-absorbers. Jeffrey and I fly over grass, and without the rubberbands the plane would flip over on landing every time. Instead, it only flips over 98.1% of the time! Don't use more than two small, light rubberbands on each side.

Bend the gear wire as shown on the plans, adjusting the axle length to your wheel thickness. Drill two holes in the fuselage sides—a 1/8-in.-dia. one toward the top and flush with the back of F-2, and a 1/4-in. hole below it and flush with the front of F-2. Place a piece of yellow No. 10 inner Golden Rod through the fuselage, and CyA it in place to the sides and back of F-2. Choose a piece longer than what you need to prevent CyA from getting inside. Also, place a piece of wire inside the Golden Rod when you CyA it to keep it nice and straight. Trim the Golden Rod flush with the fuselage sides. The 1/4-in. dowel is CyAed in place after covering.

Covering and final assembly. Final sand all subassemblies until quite smooth.

The model was covered with yellow transparent MonoKote, and those seams really disappear. I was impressed!

A MonoKote hinge was used on the elevators and rudder. The trailing edge of the hinge line (on the stabilizer) is left square, while the leading edge (on the elevator) is beveled back, on the bottom only, about 45 degrees to facilitate movement.

Place a piece of masking tape on top of the hinge line as a temporary hinge to hold the position when the elevator is folded back for covering the bottom. Cover the bottom first with the elevator folded back over the hinge line onto the stabilizer. (The fin and rudder are covered and hinged the same way.) Remove the temporary masking tape top hinge, then cover the top section with the elevator in a deflected *down* position. This creates a good hinge while also sealing the hinge gap.

When covering the lower portion of the tail post, about a 3/16-in. forward overhang is left free. After the tail post is glued in, the overhang is ironed onto the fuselage to give a nice joint.

Check the wing and tail surfaces for warps; straighten out any you find. When the wing is straight, block up the trailing edge 1/8 in. at the tip rib, hold the wing flat up to the last main rib, and heat the top covering to produce 1/8 in. of washout at the tips. With the washout the tips will be the

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see from the photos, the runways are surrounded by lawns at this time.

Solicitation of external support by Emory and other members resulted in exceptional contributions from other local businesses. Bleachers came from the local parks department. Sunscreens for the bleachers were provided by another donor. Steel columns and beams, plus roofing, were made available from surplus inventory at Monsanto, and an open-sided building was constructed. Curbs and paving were donated by another contractor; by the time you read this, all driveways will be completely paved. They had been scheduled for completion in time for opening day, but rain precluded that. The asphalt surface on the beautiful runway was paid for by Monsanto and the CRCFM Club.

The good thing about the heavy rains was that the grass looked like a carpet when AMA President Don Lowe and I attended the grand opening.

Special guests on September 17th included Don Lowe and Lee Webster (District V VP). Monsanto was represented by Bill Perdue, plant manager, and Richard Joslin, an environmental officer from the Monsanto office in St. Louis, MO. Charles Burroughs from the state environmental agency was present, along with several city and county officials.

Donors of labor and services were recognized in a nice ceremony. Emory Cole presented certificates, plaques, and trophies to commemorate the day and to offer thanks to the great individuals and companies that had contributed so much to make the model airpark possible. I've visited many model flying sites across the nation, and I must say that this is one of the best. If not in the top five, it is certainly in the top 10.

In appreciation, we would like to mention the names of the generous businesses that helped make the Emory Cole Field a reality: Damron & Sons Construction, Mid-Tenn Steel, Billy Fitzgerald Plumbing, Turner & Osborne, Goodwin & Sons Contractors, South & South, Maury County Parks, Kerr Bros., APAC Paving, Hunt Memorials, Sloan Ford, Columbia Soroptimist Club, Columbia Construction, Floyd & Floyd Contractors, B&F Paving, Occidental Chemical. And of course, Monsanto.

The members of the Columbia RC Flying Modelers Club, ranging in age from 14 to 69 years, are truly grateful for the wonderful help and contributions they have received. Led by President Emory Cole, Vice President Doug Young, Secretary Larry Ross, and Treasurer Roland Descans, the club has a truly great place to fly and an unlimited future. In their case, the sky really *is* the limit!

Note: The author is director of the AMA Public Relations Department.

SAFE FLYING IS NO ACCIDENT

Lil' Ole Reliable/Pfeifer

Continued from page 32

last part of the wing to stall; this significantly improves lateral stability.

The red Hobbypoxy is applied before assembling the stabilizer/elevators-fin/rudder-fuselage complex. Wipe the area to be painted with Hobbypoxy thinner. Use a cloth; a paper towel leaves fuzzies. Mark the outline to be painted with a soft pencil. Plastic electrical tape works well for masking off. Cut curved lines to shape before sticking them on.

To counteract the surface electrostatic properties of MonoKote and tape, which has a tendency to repel the paint from the surface, wipe the area to be painted sparingly with white vinegar. Spray on the Hobbypoxy thinly until the color is evenly distributed but not completely opaque. Remove the electrical tape as soon as the paint is dry to the touch to prevent a thick separation line. Let it cure about a week before flying or otherwise abusing the paint.

Sight from the rear to make sure that the stabilizer is in horizontal alignment with the wing. Measure the tips of the hinge line forward to the wing trailing edge, making sure that the hinge line is parallel to the wing. When everything checks out, epoxy or CyA the stabilizer in place.

Glue the fin into the stabilizer slot and the tail post to the rear of the fuselage. Again, sight from the rear to ensure that the tail post is in correct vertical alignment and the fin is aligned with the centerline of the fuselage. You can look from the front, also, if you wish.

To aid in the windshield formation, hold the adapted clear plastic in place with your fingers while using a heat gun to gently heat the corner bends. Your fingers won't let you get it too hot. The heat will set the bend, allowing the plastic to retain its shape.

Finish installing the receiver, engine, and landing gear. Check that the center-of-gravity is as shown on the plan. I had to add about two ounces of lead to the nose above the battery pack.

Whew! Writing this is as labor-intensive as building the model. But Lil' Ole Reliable is a neat plane, and I'd do it again. Hmmm—maybe an Electric version next!

Flying. The greatest thrill of any construction project is launching your new model. Nothing can match the excitement of that maiden flight. In those first few magic seconds, all the unknowns and hard work come into play.

I flew the Lil' Ole Reliable for the first time at our club's spring picnic. Believe me, having so many onlookers really intensifies those first-flight jitters. "Will it, or won't it?" keeps turning over in your head.

At least I had my green prop—and, really, I shouldn't have worried so much. The radio worked, the engine actually started, and I didn't even trip when I hand launched

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Lil' Ole Reliable/Pfeifer

Continued from page 111

it! The Lil' Ole Reliable hadn't flown more than six feet (1.37 seconds) when I knew it had been worth all the effort. Jeffrey's six-year-old instincts had been right on target. This model *flies*!

"But, dad, I want to fly it."

"But, Jeffrey, I like it. No more buts!"

Prop Noise

Continued from page 35

craft noise is prop noise. 2) The main component of prop noise is caused by torque loading on the blades. 3) The propellers available are generally very inefficient, and this inefficiency leads to high torque loads relative to the thrust that is produced.

The path to model aircraft noise reduction is therefore clear, although perhaps not easy. Making propellers more efficient would reduce noise levels without compromising aircraft performance. Next month's conclusion will present several useful guidelines for modelers to follow in choosing propellers for their own aircraft.

Addendum and Corrections To Part 2

A table was inadvertently omitted, and some revisions by the editorial staff were in error, resulting in meanings different from those intended by the authors. We ask readers to review the following items, in conjunction with the "Model Propeller Noise" article in the January 1990 issue, in order to obtain the proper meanings (in each case the italics are added for emphasis).

Pg. 39, first col., first para., first sentence: Should read ". . . propeller noise sources . . . exhibit a characteristic *pattern* at which the noise radiates away from the propeller."

Pg.39, second col., second para., first sentence: Should read ". . . 'anechoic' refers to a *condition where sound is not reflected*, by use of sound-absorbent material, to simulate the free-field acoustic environment of an aircraft in flight."

Pg. 40, first col., first full para.: The omitted Table 1, a listing of propellers used in testing, follows:

Table 1—Propellers Included in the Data Base

Manufacturer	Size	Manufacturer	Size
Zinger	8 x 6	Rev-Up	11 x 6 EW
Zinger	9 x 6	Rev-Up	11 x 7
Rev-Up	9 x 6	Zinger	12 x 6
Master	10 x 6	Tornado*	9 x 6

* Three-blade propeller

Pg. 40, first col., first full para., second sentence: "Propellers were chosen for being typical of those in use today *and the ability of the O.S. Max 0.46 SF engine to turn them.*"

Pg. 40, third col., second full para: Delete. (Propeller noise always occurs at the blade passing frequency and does not reach a crescendo there.)

Pg. 40, third col., last para., third and fourth sentences: "An efficient propeller will produce more *thrust with the same engine output at the same flight conditions.* An inefficient propeller *causes the engine to do work to turn the prop while producing little thrust.*"

Pg. 41, first col., first para.: "The advance ratio, denoted by the symbol J, is *proportional* to the ratio . . . ."

Pg. 148, second col., first para., last sentence: ". . . props that are more efficient at high speeds will provide reduced noise levels as compared to less efficient props *at the same performance levels.*"

Pg. 148, second col., first full para., last sentence: ". . . we can reasonably *suspect* that the measured noise source is in fact torque noise."

We regret the omission and errors.

Carl R. Wheeley
Editor and Publisher

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