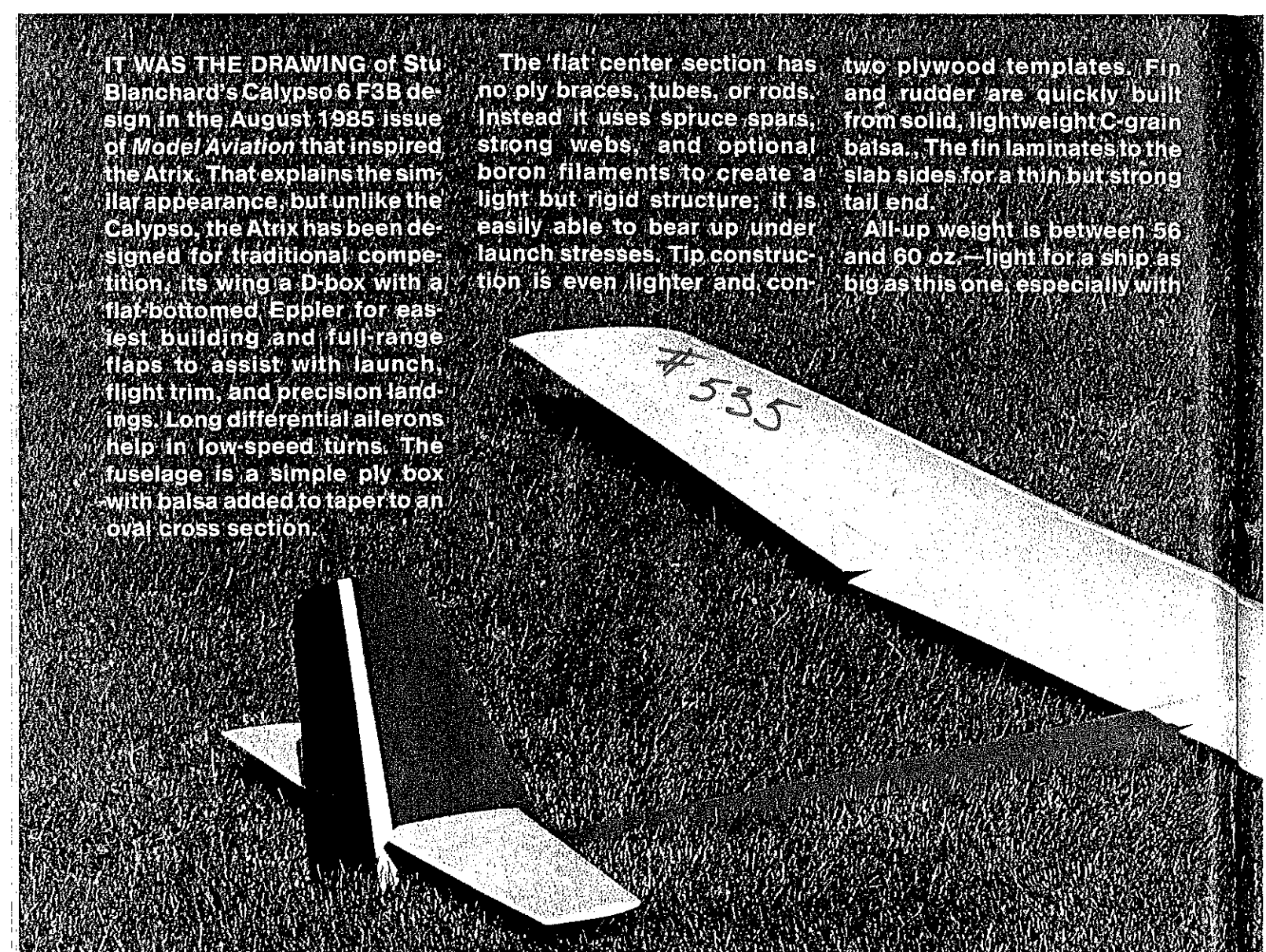
atrix

IT WAS THE DRAWING of Stu Blanchard's Calypso 6 F3B design in the August 1985 issue of *Model Aviation* that inspired the Atrix. That explains the similar appearance, but unlike the Calypso, the Atrix has been designed for traditional competition: its wing a D-box with a flat-bottomed Eppler for easiest building and full-range flaps to assist with launch, flight trim, and precision landings. Long differential ailerons help in low-speed turns. The fuselage is a simple ply box with balsa added to taper to an oval cross section.



The Atrix utilizes a high-tech transmitter to mix ailerons/rudder and flaps/elevator. The flap (throttle) trim tab can subtly modify the airfoil. Also, this tab or the transmitter stick or a programmable pushbutton can be used to reflex the flaps (upward for rapid sink), thus eliminating the need for spoilers. Full down flap dramatically reduces the airspeed, but control remains excellent during descent, allowing precision landings to be made. Throw adjustments and dual rate provide the fine tuning. Put it all together and you have a wonderfully smooth-handling, graceful, and efficient thermal machine. You may be surprised to learn it's built of the commonest materials.

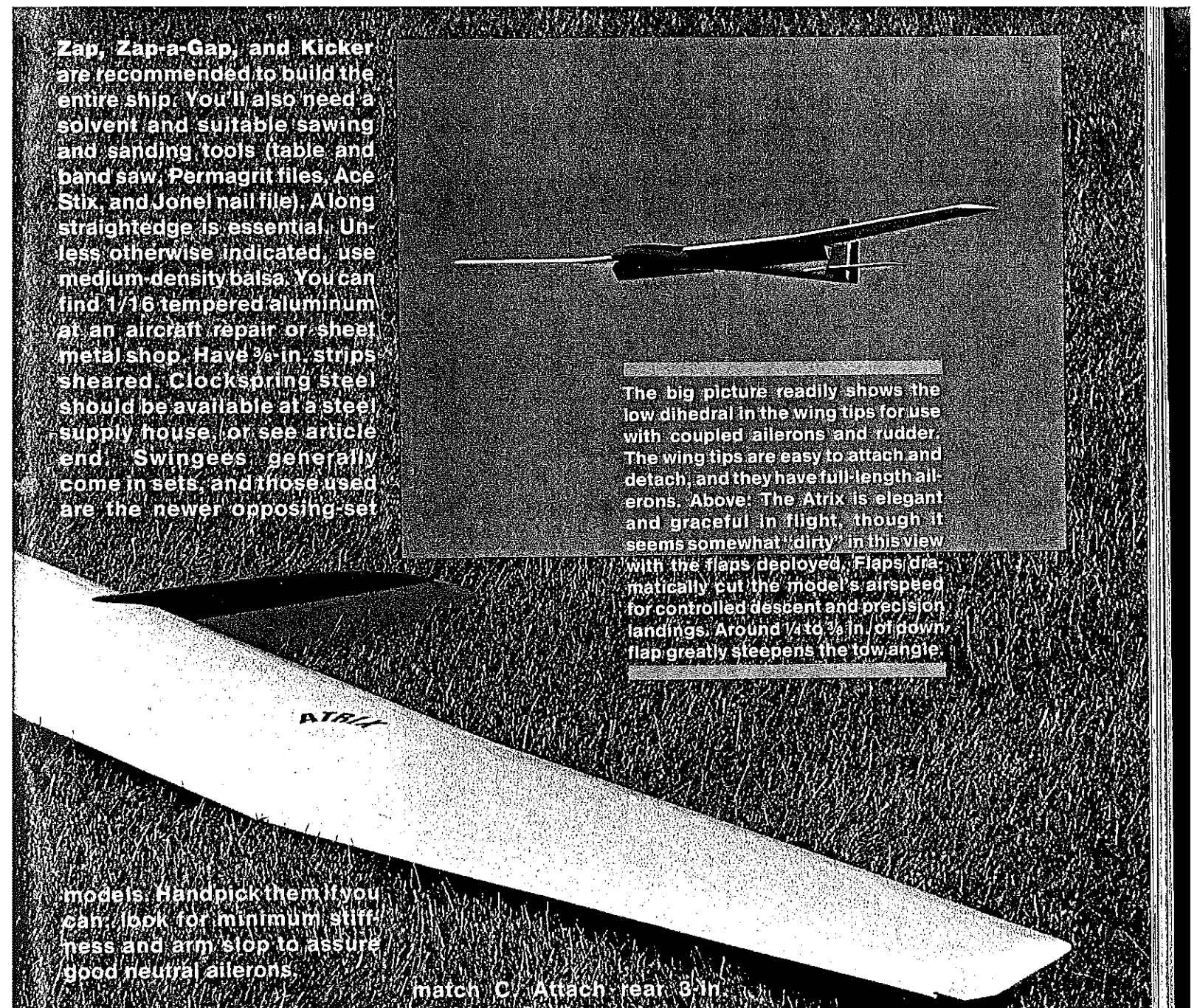
The flat center section has no ply braces, tubes, or rods. Instead it uses spruce spars, strong webs, and optional boron filaments to create a light but rigid structure; it is easily able to bear up under launch stresses. Tip construction is even lighter and contributes to buoyancy and turn response. Detachable tips are supported by clock spring steel blades secured with setscrews. Flaps are mechanically simple and most effective; aileron linkup is quick, simple, adjustable, and foolproof.

The wing is secured with inexpensive, easily-replaced, tempered aluminum hold-downs of negligible weight. All ribs are made with the aid of two plywood templates. Fin and rudder are quickly built from solid, lightweight C-grain balsa. The fin laminates to the slab sides for a thin but strong tail end.

All-up weight is between 56 and 60 oz.—light for a ship as big as this one, especially with such elaborate controls. Heavier, it flies well, maybe better. Tow is stable and steep.

The Atrix is particularly clean. Both the ailerons and flaps fit flush with no external hardware. The wing fairs in, the stab butts to the fin, the hatch slides, and the antenna runs down the fuselage. The switch is inside. In flight it whispers by.

Zap, Zap-a-Gap, and Kicker are recommended to build the entire ship. You'll also need a solvent and suitable sawing and sanding tools (table and band saw, Permagrit files, Ace Stix, and Jonel nail file). A long straightedge is essential. Unless otherwise indicated, use medium-density balsa. You can find 1/16 tempered aluminum at an aircraft repair or sheet metal shop. Have 3/8-in. strips sheared. Clockspring steel should be available at a steel supply house, or see article end. Swingees generally come in sets, and those used are the newer opposing-set



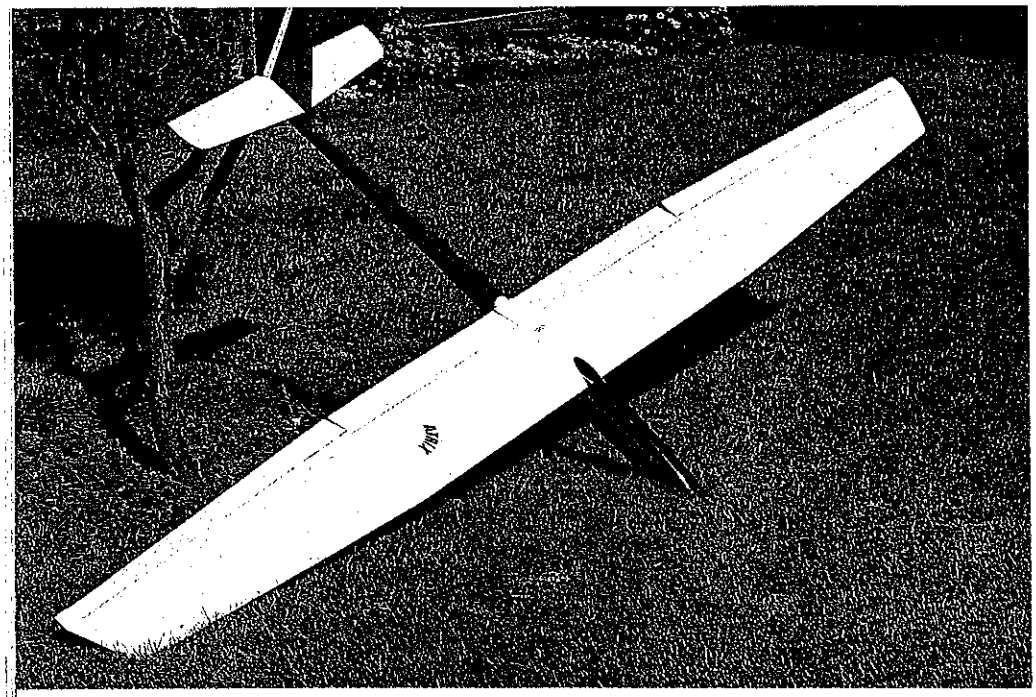
The big picture readily shows the low dihedral in the wing tips for use with coupled ailerons and rudder. The wing tips are easy to attach and detach, and they have full-length ailerons. Above: The Atrix is elegant and graceful in flight, though it seems somewhat "dirty" in this view with the flaps deployed. Flaps dramatically cut the model's airspeed for controlled descent and precision landings. Around 1/4 to 3/8 in. of down flap greatly steepens the tow angle.

models. Handpick them if you can; look for minimum stiffness and arm stop to assure good neutral ailerons.

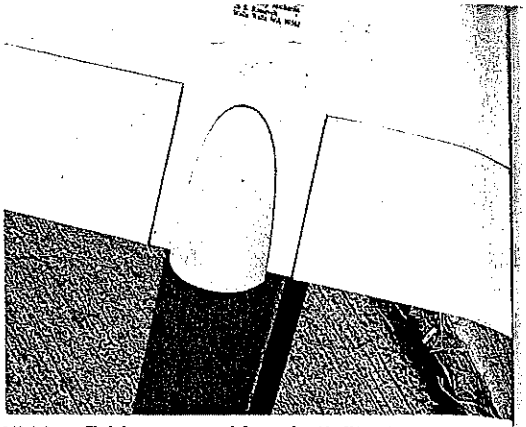
Wing. Lay the plan patterns over 1/16-in. ply, and push a pin through them to outline the cap and rib templates C and T. Mark and shape, checking against the pattern for 1/16 sheeting setback. From 1/8-in. birch ply, prepare ribs 0 to match C. Attach rear 3-in. doublers. Cut four 1/8-in. and a dozen 3/32-in. ribs out of medium-grain balsa. Be sure to cut ribs a hair beyond the edges of template C to allow for finishing; then clamp between the 0s, and fine-sand until they match. Mark for notches and

use the gauge (see plans) to cut. Trim ribs through 2, 1/32 on top and 1/16 on bottom, for leading edge sheeting and doublers.

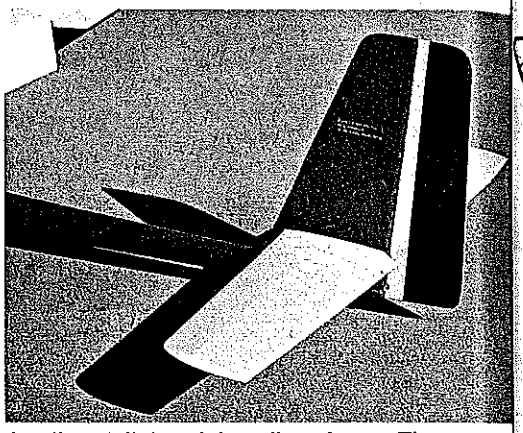
This sleek RC Sailplane was inspired by one of the most innovative entries in the most recent RC Soaring World Championships—but it is good for both AMA and FAI events. Like all high-performance models, construction must be correct to achieve the desired results. ■ Harley Michaelis



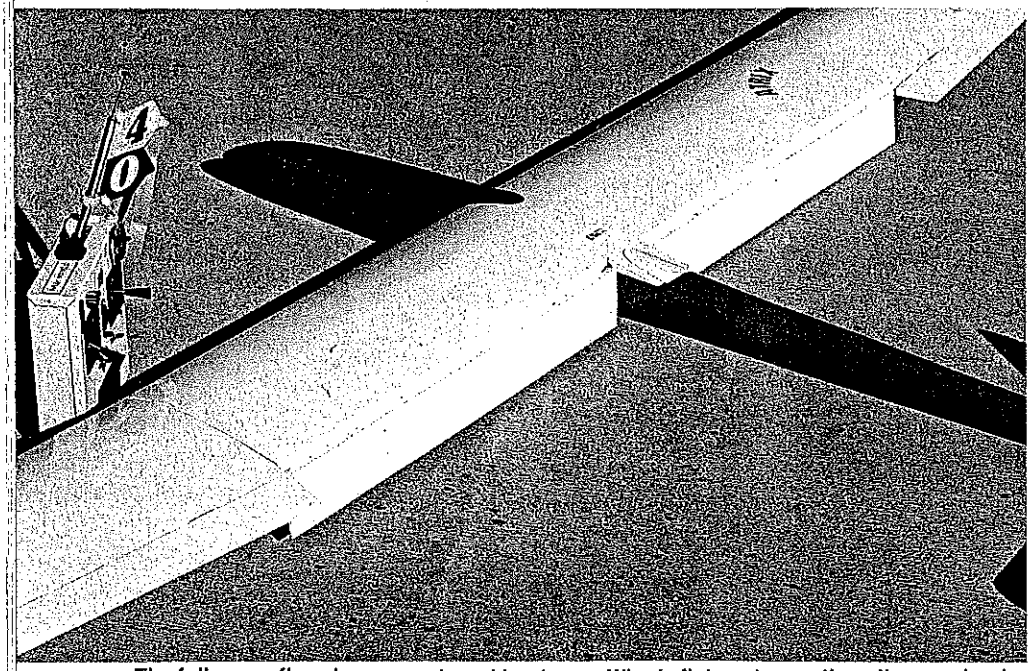
Clean lines are evident. The wing is simple D-box construction. Fuselage is plywood and balsa with a pine nose. You won't find much sticking out to create extra drag. Pics by author.



Hidden Z hinges provide a butt fit of the flaps as shown here. Same for the ailerons.



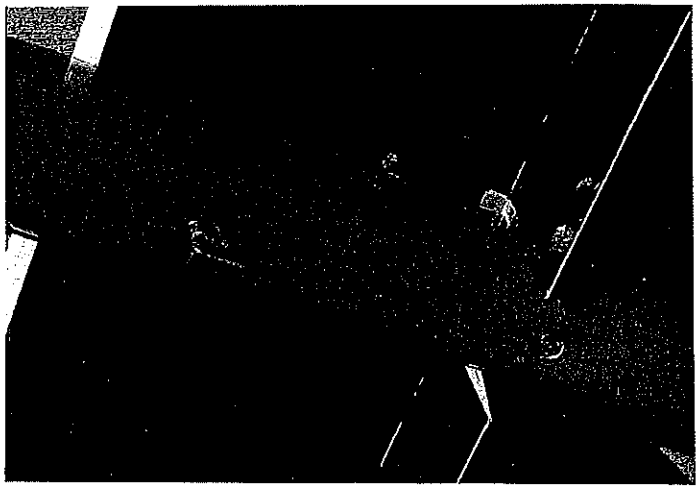
Small and lightweight tail surfaces. The sheet balsa fin laminates between the fuselage sides. The low stab position gives minimum fuselage stress if you dork a landing.

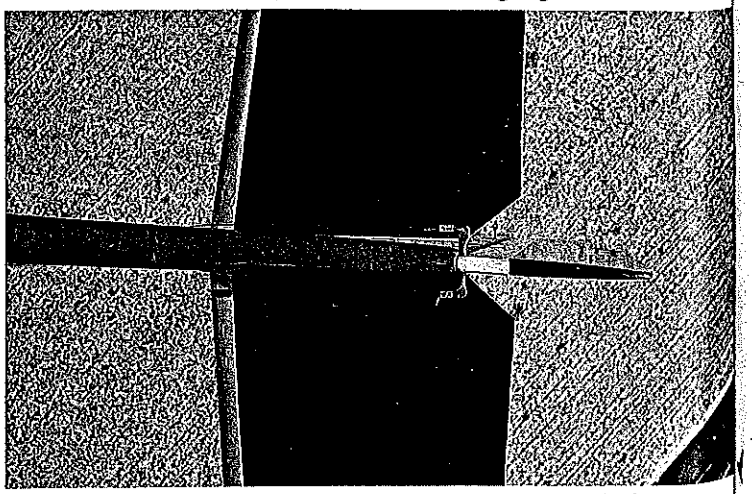


The full-range flaps have no external hardware. Wing's flat center section allows a simple, flight-ready setup. Text has details of how to couple the movement of the flaps and stab.

Join plans for the center section. Space the Os so that the aileron servo fits snug with ¼-in. rails at each end. Prepare and position the front and rear plates as shown. From a Goldberg strip aileron hinge set or wire from Du-Bro 4-40 rod, make a "U" with a 3/32 collar slipped on. The "U" axis floats as the flaps move on "Z" hinges (these will be detailed later). File notches into the Os about ⅛-in. deep and ⅜-in. wide for this float and about ⅜-in. wide and 7/16 high to allow clearance for the sockets and couplers. Attach a piece of 1/16 x ¾ x 1⅛-in. ply to the rear plate for a blind nut. Other parts of the "bridges" go on *after* hinging.

From trued-up 4-in.-wide 1/16-in. harder balsa, cut the bottom leading edge sheets to

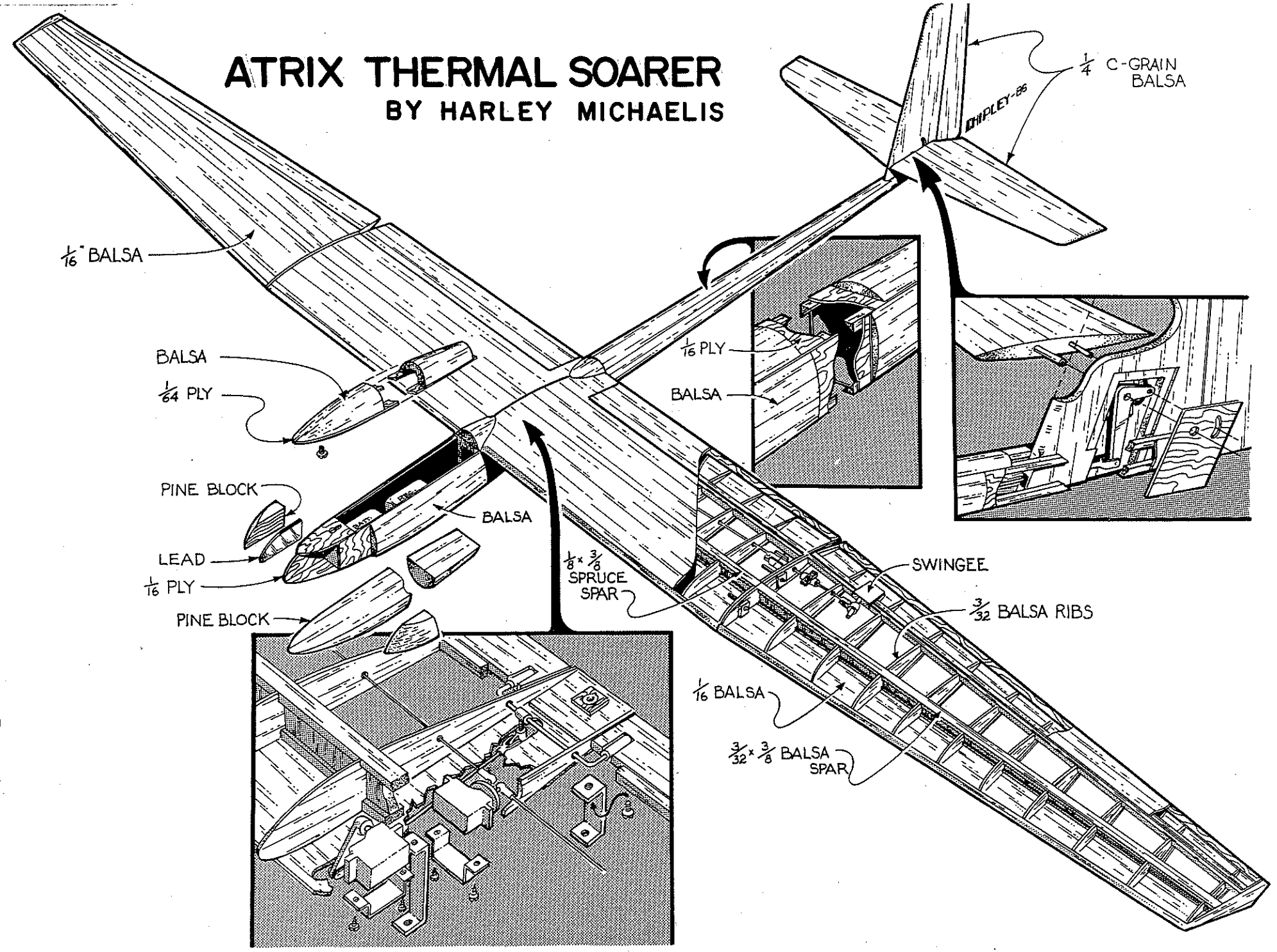


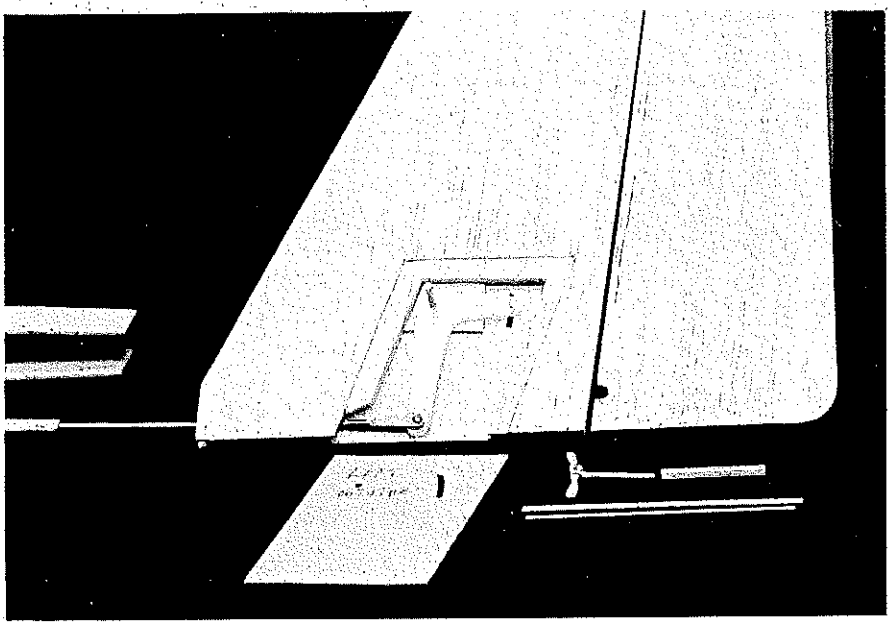


Left: The wing is secured to the fuselage by internal tapped hold-downs. Note the combination tow hook/bolt at the front, to the right in the picture. Right: Cables to a T fitting operate the rudder. Tail surfaces are built from ¼-in sheet balsa (optional cutouts and ribs for stab).

ATRIX THERMAL SOARER

BY HARLEY MICHAELIS





A view of the bellcrank mounted in the vertical fin, inlays, pushrod, rudder T and tube, and stab support wires. Hopefully photo reproduction will show what C-grain balsa looks like.

extend from under the 0s to the end cap. Cut off a ½-in.-wide strip; fit and pin at the hinge line. On the 3½-in.-wide balsa remaining, strike a reference line for the rear of the sub leading edge, and pin it down. Place a ⅜-in.-wide strip between them at the spar. Add bottom doublers through ribs 2 forward of the spar.

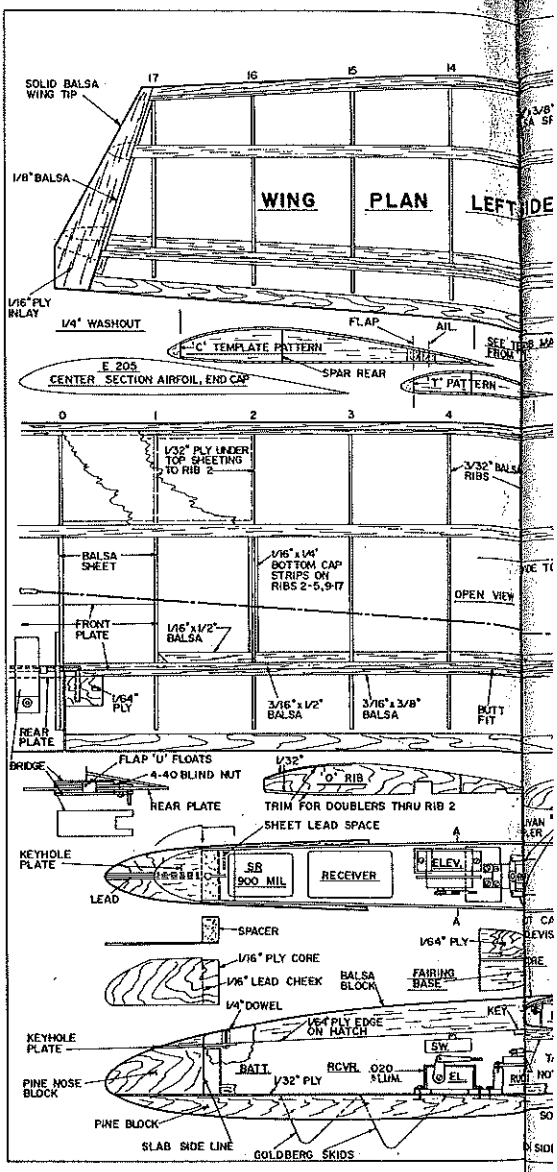
Cut flap bottoms to fit 1/32-in. from the plate to the outside of the cap. Mark and bevel the rear ½ in. to about nothing. Over the backing from MonoKote or other covering, wick on ½-in.-wide strips of 1/64 ply with Zap. Pin in place.

Boron filaments are optional, but they help to produce a rigid center section. *They are strictly for careful builders!* A 1,000-ft. spool of filament is available for $25 from Model Research Labs, 25108 Pky, #B-160, Mission Viejo, CA 92692. About 200 feet (4/100 oz.) is used.

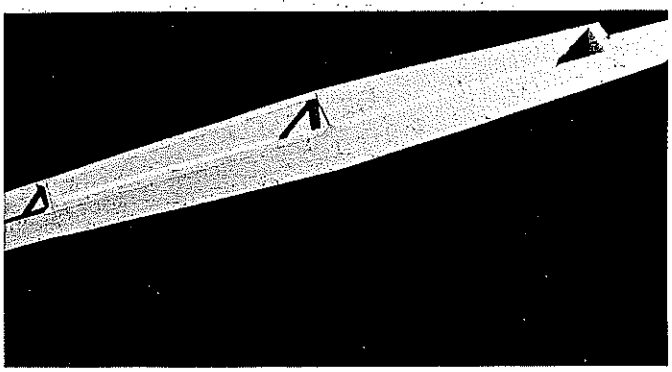
Careful handling is essential. Begin by making a shallow box for the foam spool with a dowel and washer for it to turn on. Make a hole or slit in the box edge through which to dispense the filament, and lay the whole thing over the plans or other white background. *Use eye protection.* With bare hand held over the filament, use pliers to break off 30 pieces, each 3 ft. long. *Meticulously* inspect hands and paper for tiny shards, and pick them up with masking tape. Dangle the filaments between your thumb and index finger to smooth them flat. Center the filaments along the spar line, and smooth them flat and straight. Use covering film backing around your finger to hold the filaments where you will apply glue. Tack at the center and toward the ends with small drops of thin cyanoacrylate (CyA). Let each application wick out and set without accelerator. *Never run fingers back against broken ends.* Fit the one-piece bottom spar, apply thick CyA, and hold flat with a board edge until set. Stick pins adjacent to the rib on the cap to align. Spray ply with CyA accelerator, put slow CyA on rib, position, and hold flat. Lay cap sets together. Drill 1/16 pilot holes, add doublers for the tubes and pins, drill out, and set them in. Cut slots for the steel bar.

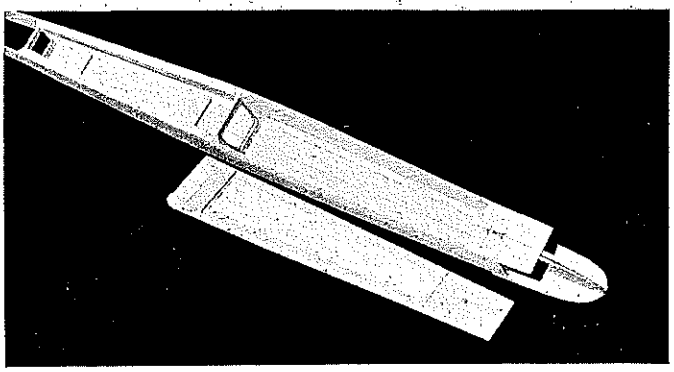
Glue the ply ribs over the spar and plates. Add other ribs with a fine teflon CyA applicator to assure that no glue extends beyond 3/16 in. either side of the hinge line.

See Center Block Assembly (CBA) detail. Fit ply pieces between the ribs and spars. Stack and drill dead center for 6-32 Du-Bro blind nuts. Enlarge the hole in the center piece to accommodate the flange. Laminate the assembly, flanges butting, by running a bolt through, or use "Fast Threads" (Ace or Tower) in a one-piece hard block.

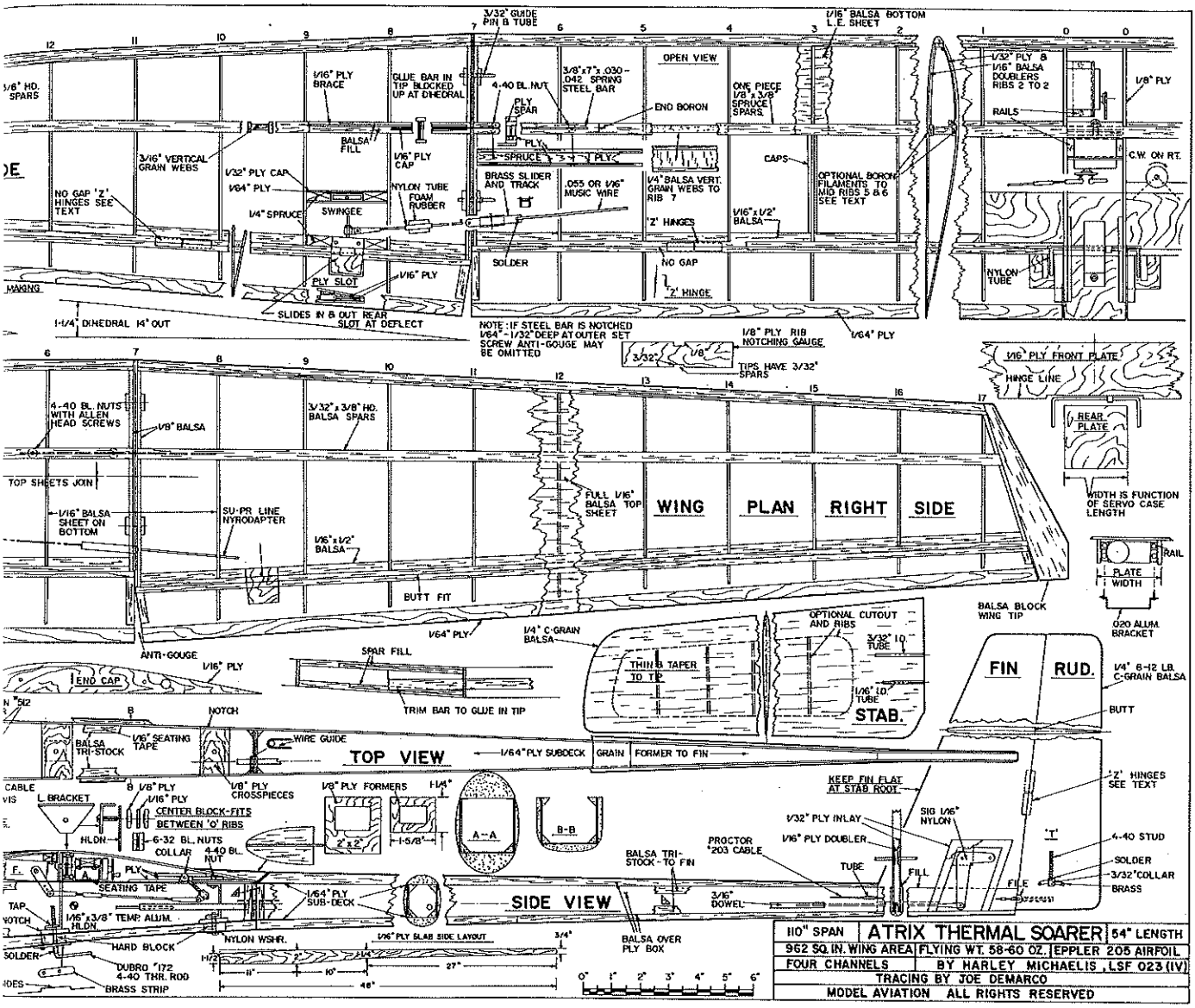


Form hold-downs from 1/16 x ⅜-in. tempered aluminum, brass, etc., as shown on the side view. Avoid overlength. Make spares for your field kit. Glue 1/16 ply plates to the center block assembly as a slot to center and key the hold-down. Form an L bracket from a 1/16 aluminum extrusion. Position the hold-down, L, and top spar on the center block assembly. Through the nuts, drill a 1/64 pilot hole through the





Left: Here we see the setup of the 1/16 ply slab fuselage sides joined with two formers and the nose core/spacer block. Right: Ply bottom with crosspieces, keyhole plate added. Lead ballast cheeks glue to the core. The hatch has 1/64 plywood edging and a rear alignment key.



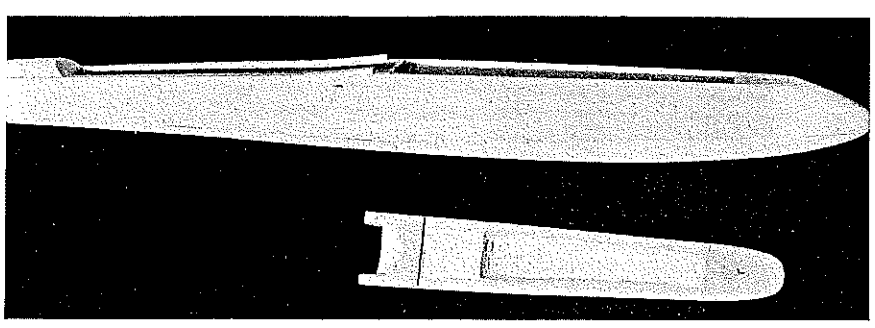
aluminum pieces, then enlarge to 7/64 in. Attach, check the alignment, and glue the assembly in place.

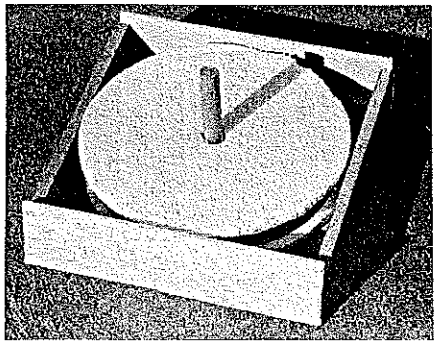
Fit the vertical webs precisely. Make a dry run with the spar and web stock to determine the amount of thick CyA you'll need for a good joint. Web to rib 5. Unpin the panel. Wick the ribs to the sheeting with CyA. Shape the sub leading edge.

Study the details of the steel bar receptacle. Solid glue joints are essential. Side members *must match* the bar height for *no* play.

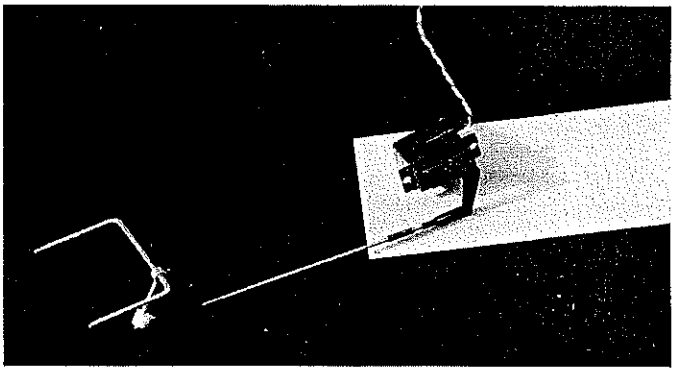
The plans show two setscrews in blind nuts for a friction hold of the tip. However, the following locking setup later proved to be advantageous. Set a blind nut at the rib 6 locations only, and with a Dremel tool, notch the bar about 3/32 in. deep to receive a 1/4-in.setscrew for a 3/8-in. socket-head screw from the wing underside. Also trim off the bar to slide over the head of the blind nut. Have the bar locked in place without play outward when later gluing it in the tips—*flush*. With this setup the inboard ends of the ailerons need not be angled. Use ply, both top and bottom, so as to center the bar vertically. Make sure the bar slides easily, then cap. Fill to the spar edge with balsa. Add the top spar and boron filaments as on the bottom.

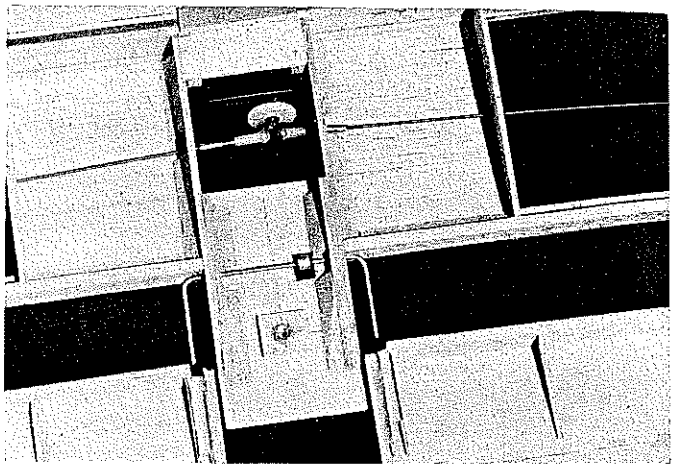
Section ribs at the hinge line for the 3/16 members. Refer to template C for cross sections. To make beveled and tapered aileron strips, start with a 3-in.-wide sheet. True the edge, cut the bevel, and then cut the taper. (The table saw and band saw are very useful here.) Be sure you true the edge of the sheet before cutting each successive strip.



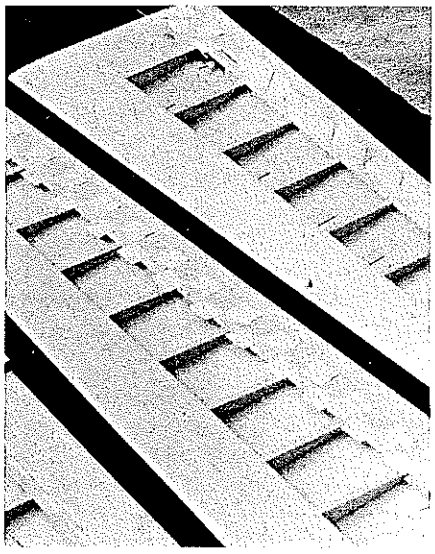


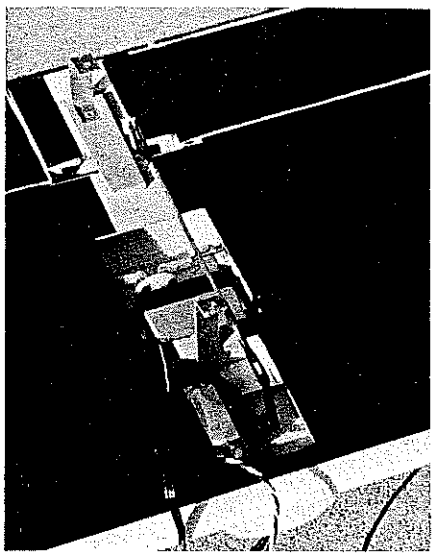
Left: Pine cheeks and belly of the fuselage. Balsa planks are added and shaped. Right: Box the author uses for dispensing boron filament. The strand exits through a hole in the edge of the box. ***We caution everyone that use of boron isn't for the haphazard. Use extreme care!***





Above: The flap mechanism, shown here in its entirety, is functional simplicity. Right: Tubes receive the "U." Single-piece rear plate shown here was later changed to two with bridges as per the plans. Dark band on spar is the bundle of Zap-applied boron filaments.





Left: Z-hinges in three stages of installation, all prior to applying the "Tex" covering. Right: Spaced plates with bridge. Servos are held in place by brackets. Tapped aluminum hold-downs, easily replaced, are a practical means of anchoring the wing to the fuselage.

Glue the leading edge to the flap. Add the 1/64 ply base, and drill a 1/8-in. hole in the leading edge for tubes. Groove the structure so that the axis of the wire is at the hinge line. Position and tack the tubes with CyA. Remove the U, and secure the tubes between the partial ribs.

From harder balsa, cut flap tops at least 1/4 in. overwidth. Bevel the last 3/8 in. to about nothing. Position the tops 1/8 in. beyond the flap trailing edge, and wick with CyA—first to 1/64-in. ply, then to the ribs, and finally to the leading edge. Fine-sand along the hinge line for a butt fit, carefully preserving the sharp edges. Feather the trailing edge.

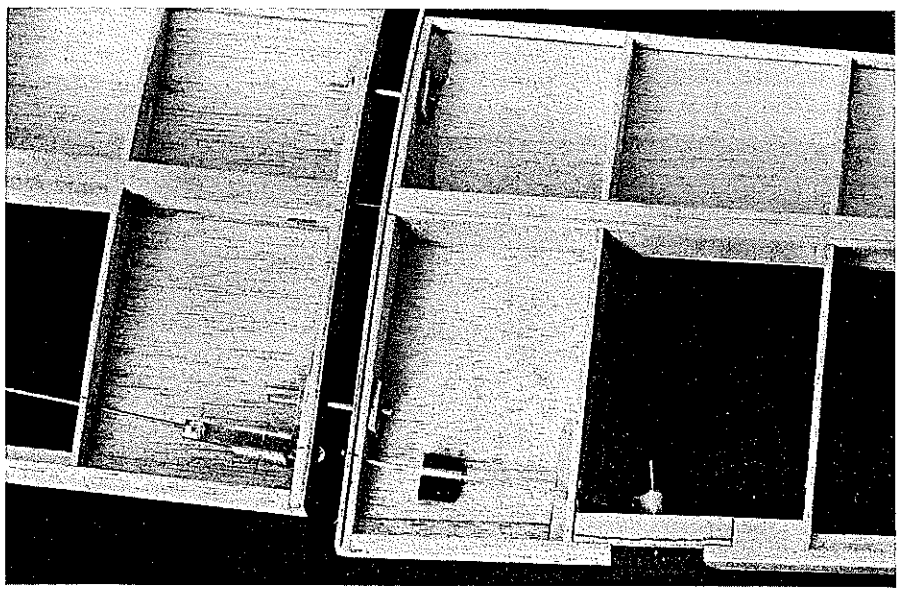
Add strips to the spar and sub leading edge for attaching the 1/32 subsheeting. Slip for the L bracket.

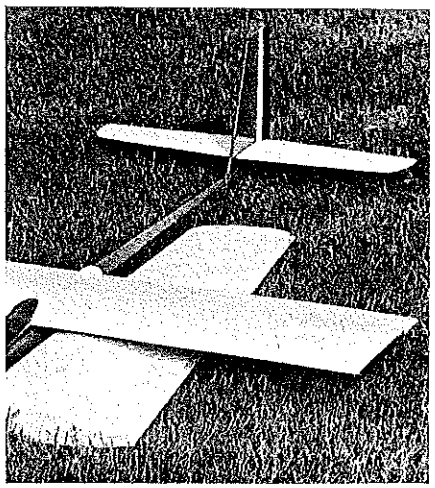
A note on mixing the aileron and rudder: Reversing switches on the transmitter may affect direction only *on the prime channel!* Set the aileron switch to move its servo clockwise on right command. Later, set the rudder channel switch to move in the proper direction, mixed and unmixed, crossing cables if necessary.

Put 1/16 ball links into 45°-offset output holes of the aileron servo. Glue the nuts. Position the case so that the sockets pass above the bottom sheeting as the wheel rotates. If necessary, plan a cut in the top sheeting to allow for 1/16 extra overhead for the case end. Jam a plate of balsa between the 0 ribs down to the servo as a guide for placing the rails. Fashion the bracket to allow some cinching down, seating tape on the underside.

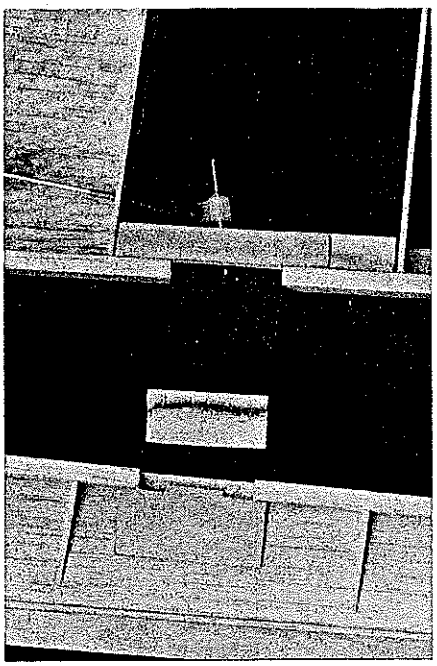
Make the slider track. The 1/16 hole for the brass sliders is just outside the end cap in neutral.

Build the tip sections as you did the center, but without the boron. The 1/16 x 1/2-in. members are of hard balsa. Spars are hard 3/32 x 3/8-in. balsa. Use template T to make the No. 17 rib. Stack-shape ribs

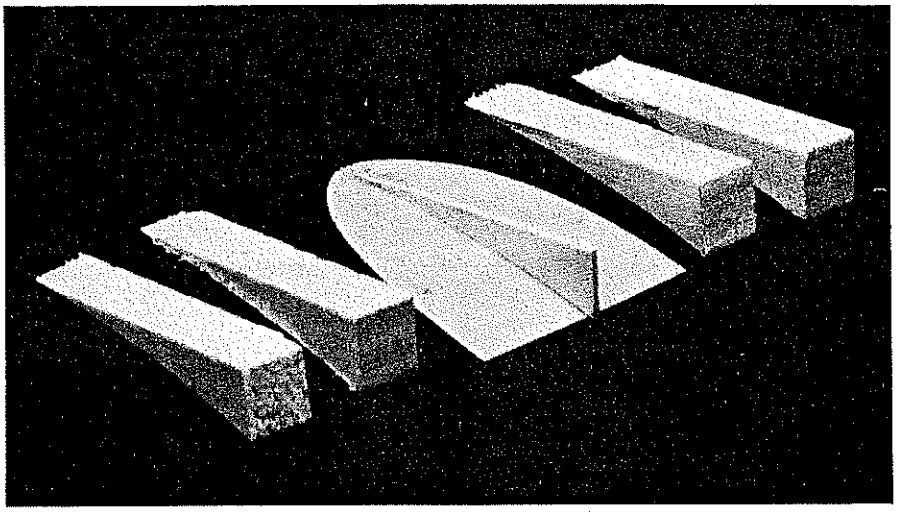




Left: Steel bar glued in tip (right) slips into receptacle. Threaded rod from the Swingee aileron actuator slips into slider hole to link the aileron. Right: The 33-in. wing tips quickly engage and disengage. Ordinarily the center section is left on the fuselage for transporting.



Swingee front is blocked and glued in place. The rear slides between ply plates during deflection for desired non-gap ailerons.



This shows what you need for wing fairings—plywood base and core with balsa sides.

numbers 8 through 16 between templates C and T. Sand bevels to the lower edge. Save these as patterns. Scribe around the template on 3/32 stock, and cut along that line for the actual ribs. Make extra No. 17s of 1/8-in. balsa to swing out. Sand slightly to conform.

Jack up the tip to form the dihedral. Make ply braces for a good fit between spars and ribs 7 and 9. Glue the end cap so the caps butt and the sheeting jams the cap. Cut a section out of No. 8 for the longer brace, and glue it in, then glue the bar to it at the dihedral angle, bar locked in place without play. Add ply fill, top and bottom, then cap with the shorter brace.

Swingee installation: soak stiff Swingees in oil, and clean their exteriors. Notch the spar on the 1/16 x 1/2-in. strip to receive the Swingee. The fit should be snug. When the arm in the right tip moves to the left, it moves the Swingee *up*. Position it with the hinge pin at the hinge line. With the smooth side down, drop CyA into the body holes, and press. Glue 1/4 x 3/8-in. spruce blocks at the sides, sanded to the same thickness as the Swingee. Add a 1/32 beveled ply cap.

Slip a Goldberg 3/32 adjustable horn bracket onto the arm, and use a Swingee nut (metric) to force it 1/8 in. out from the Swingee body to maximize deflection.

A sharp right-angle bend will be needed to slip well into the slider hole. The soft 1/16 Su-Pr-Line Nyrodapter is a good rod to use. Mechanical trim of the ailerons will be accomplished via this rod and clevis. A heavy-duty nylon clevis can be used if it is drilled out with a No. 47 bit. Use Loctite with a metal clevis, but work it in and out in order to free it up enough so that adjustments can be made. Screw the rod in a little shy of midway on the threads. With the Swingee in neutral, mark the rod at the cap, then remove and bend. Trim to a bit over 1/8 in., and smooth off. Use a keeper with a metal clevis. Foam rubber will permit depressing the wire to engage the slider. Glue the Goldberg tube guides. Cut them longer than the foam to eliminate bonding of the wire within the tube.

Place a 1/16 ply shim under the Swingee behind the aileron leading edge. Cut a slot in the leading edge as far as the ply. Sand a ply wedge to fill the space between the Swingee and the top sheet. With the wedge and top sheeting in position (1/8-in. overlap front and rear), run a pin through to mark it. Glue the wedge to the sheeting only; do not glue to the Swingee.

With tips attached, manually check the pushrod operation for binds and hangups. Make sure the bent rod moves easily but with tension into the slider hole. Radio check the aileron operation. Move the adjustable horn brackets in or out for matched throws, and treat the nuts with Loctite.

For the center section top sheeting, true the edges of harder 1/16 x 4 x 48-in. balsa, and size the sheets to about 1/4-in overhang front and rear. Determine which are the top sides, and invert them over the backing from covering film. Butt the edges, hold flat, and dispense the tiniest drops of thin CyA to join them. Fine-sand the top side.

A center section without twist can be had if you apply the top sheeting while the structure is attached to a suitable board. An

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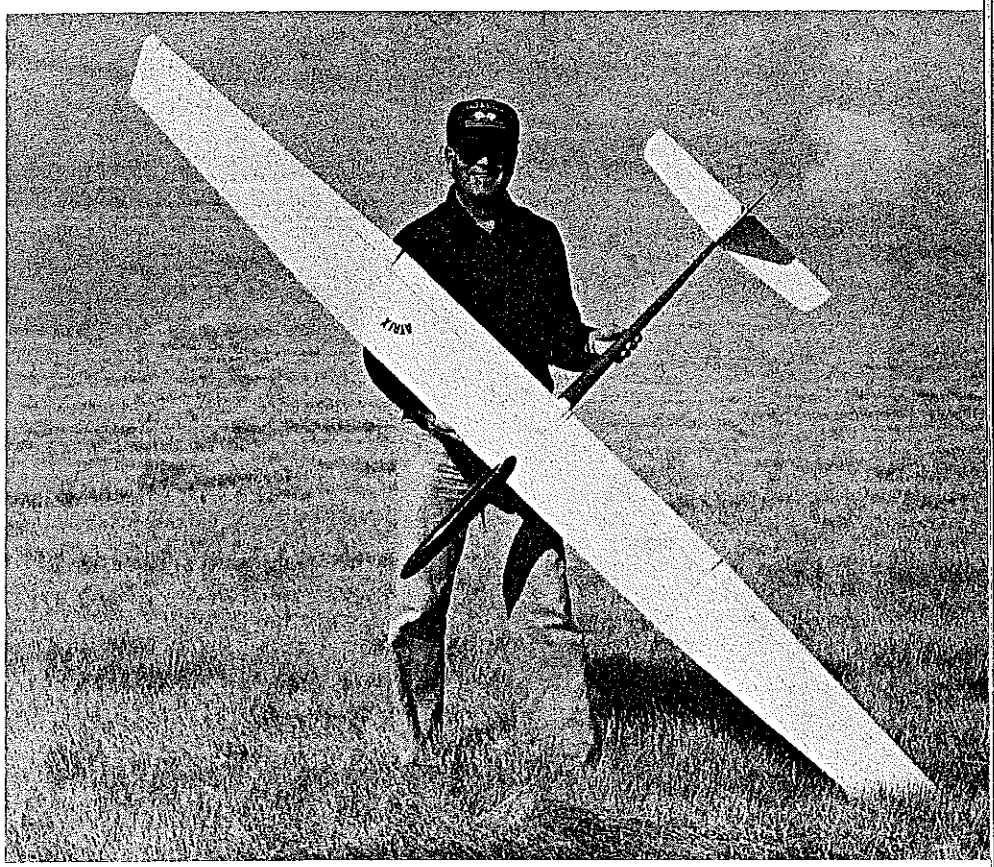

Our author with his Atrix. Harley says he's been cutting balsa for over 50 years. He's an early LSF member (LSF 023), and he has achieved Level IV in the LSF accomplishments program.

inexpensive pressboard shelf from the center of the store's stack is a good bet. Rip it to an 8-in.-wide piece, and keep the surplus. Secure the structure to the board from the spar rearward with bits of servo tape.

Make keying marks across each end at the caps, and join to the spar with thick CyA, holding with a surplus board until it sets. With the main board on edge, let gravity pull the slower CyA down the ply subsheeting at about 2-in. intervals. Hold until set, then work first to one tip, then to the other, two or three ribs at a time. Wick the overhang to the sub leading edge with instant glue. Proceed in the same manner rearward of the spar.

Trim excess, sand straight, and add the leading edge. Fine-sand to achieve a precise mating with the flaps. Keep edges sharp. Cut out a section in which to inlay the L bracket.

Sheet the tips as above, but build in washout by raising the rear tip with a ¼-in. beveled strip along the hinge line. Shape the leading edges, but don't round them where the hatch butts.

Flap/elevator mixing: The elevator pushrod moves forward to impart down—and with down flap. To achieve proper elevator action, mixed and unmixed, the direction of motion can be reversed either with switches or by flopping the servo to its opposite side.

You'll need a squat flap servo such as Airtronics' 94461. (Leads 1, 2, and 3 are signal, negative, and positive, respectively.) The long Futaba FSH-6E arm fits the 94461 shaft and makes a good setup. Block around the case so it can't move. With the stick at extreme throw and trim tab centered, angle the arm about 45° rearward. Secure with a bracket.

Fuselage. A tablesaw and band saw are a big help here. First rip a pair of 2¼-in.-wide pieces, and position them so that any twists will be opposing. Hold the two together with thumbtacks or spot glue. It's best to align these along the top behind the spot where the front former will go. Sand there to a fine finish. Mark one side, and cut both to profile with the band saw. Notch for ⅛-in. ply crosspieces, and sand all edges true. Make the formers. Add a block to the former to provide a place to attach the servo. Glue triangular stock to the front former. (Rudder servo can also go behind the former.) Join front former at right angles in an L-shaped jig to get the fronts even. Add triangular stock to the rear former, bevel the edges, and glue it on.

Prepare the nose core. Angle the edges in the same way as the sides. The keyhole plate recesses on it. Fit, add spacer blocks, and cap the rear with 1/32 ply. Trim where the hatch screw passes. Prepare the keyhole plate without the keyhole.

Add hard triangular stock between the formers and forward on the bottom to the spacer blocks. Clamp in the nose core. On 1/32 ply draw a centerline for the bottom. Position the fuselage on it, and mark an outline along its exterior. Fit and glue on

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the crosspieces. Invert everything onto the work surface when gluing in the core assembly, and shim with the keyhole plate so it is on a plane with the top edge of the sides. Glue on the ply bottom.

Cut the fin to profile. Make inlays and cutouts in the fin to match. Center 3/16 x 1/4-in. strips inside. Slot the fin bottom. To avoid slop or bind, use a No. 40 bit for 3/32 wire and either a No. 51 or 52 bit for the metal clevis pin on the bellcrank. A No. 54 bit will hold 1/16 wire tightly.

Add inlay doublers; glue on one inlay, then position the bellcrank inside and drill a 1/16 pilot hole at the pivot point. Remove the bellcrank. Attach the other inlay. Put a 1/16 shim between. Drill a hole with a sharp 3/32 bit. Mark, cut, and smooth the 1/16 wire arcs. Insert the bellcrank with the clevis and Goldberg true 1/16 threaded rod attached. Make the main 3/32 support, and run through. Widen the slot so the clevis doesn't bind. If the bellcrank binds, pry between the doublers. Zap the wire in. A dowel-end drill guide may be made with 2 in. of 1/16 I.D. brass tubing shimmed to 1/16 in. with 1-in. bits of telescoping tubes.

Add triangular stock to the point where the fin extends for the 1/64 ply subdeck. With the pushrod through the formers, glue the fin to the right side of the stab flush with the bottom and 1/16 *in from the end.* Clamp between the other side. Put a pin into the front of the fin, and run a string to the nose. Shift the left side of the stab to the fin to align the slab sides, then glue on a 1-in. length of subdeck to hold in alignment. Ignore fin tilt.

Put a pin 1/8-in. off center at the nose, and lay a long straightedge from it to the fin side to align for no built-in turn. Clamp there, ignoring tilt. Sand the sides precisely to the fin rear to establish this position. Unclamp, apply slow glue, then reclamp.

Bring the fin upright by twisting the fuselage between your knees as about 1-in. lengths of subdeck are progressively added from the fin forward, top and bottom, with slow CyA. Protect your fingers with backing. Sand the edges in plane with the sides.

Glue in the keyhole plate. Glue 1/16 sheet lead cheeks (from a plumbing supply outlet) to the nose core. This adds 3 oz. to balance with an 800 to 900 mAh battery pack.

Using the band saw, cut the exterior planking for shaping using hard blocking up front and by the hold-downs. Attach with slow CyA and accelerator.

Feather to the box, except by the saddle center. When the fuselage is ready for fine sanding, position the hatch block at the wing leading edge point. Mark the perimeter and profile. Cut with a band saw, and add 1/64 ply along the edges. The excess at the front of the 2-in. block can be glued to the rear over the ply edging to give extra width and length. Attach the rear key. Drill a 1/16 hole in a length of 1/4-in. dowel, and center it in the block where the screw goes. Drill through to locate the keyhole slot rear. Shape the keyhole. Adjust the screw ver-

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adequate. We had another serious accident the other day, an injury to a pilot's hand which required numerous stitches. Fortunately, we're close to the emergency squad, and they arrived on the scene very promptly. We also were fortunate to have had several very competent folks on hand who knew how to deal with pressure points and tourniquets. Please, don't fly alone, and above all, give that prop the greatest respect. Had the individual been by himself, I believe he would have been in a very serious, if not fatal, situation. That's how bad the cut was."

The RC flying field at which the above incident took place is not equipped with a telephone. However, all members are advised that there is a telephone at a gas station which is a couple of hundred yards down the highway from the entrance to the field. Dick Roe, who wrote the above account, was present at the club field when the accident happened. He tried to summon help by means of CB Channel 9, "...and got absolutely nothing, so don't count on CB to be of much help."

Have a safe month.

John Preston, c/o AMA, 1810 Samuel Morse Dr., Reston, VA 22090.

Plane Talk/Winter

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balsa wings—200,000 RTFs (ready-to-fly) a year. Two different cultures, seldom crossing. In the late 20s, *American Boy* tied in with the Aeroplane Model League of America (AMA's predecessor) and had over 300,000 members. There were contests and Nationals—and fine flying balsa, cement and tissue aircraft. Lindbergh flew the Atlantic, and one result was Bernar MacFadden's start-up of *Model Airplane News*. The fusion point! According to the Rockefeller Foundation there were 2,000,000 of us (Air Youth) in the Thirties. What sparked Air Youth was the masses of modelers created across the nation by the Hearst newspapers' Junior Birdmen and the Scripps-Howard papers' Junior Aviators which followed. Lindbergh turned on the world—model and full-scale.

When at long last all these things came together, reinforced by magazines like *Flying Aces* and *Air Trails* (a monster with a larger audience than all of our current magazines combined), white-hot progress became, commercially, a case of the devil take the hindmost.

They are almost all gone now, the old ones. I think of Ray Arden flying a Gas model across Van Courtland Park in 1904, or Merrill Hamburg, who made AMLA. Jim Walker—the magician of showmanship. Joe Ott. A few who are with us yet: Charlie Grant, Bert Pond. I am not convinced that anyone will salvage our history. Does anyone care? Do you care?

Bill Winter, 4432 Altura Ct., Fairfax, VA 22030.

Editor: This is the last of Bill Winter's "Plane Talk" columns. Bill has already written a number of you to this effect, and as news spreads like wildfire, these words may sound like something you've heard before.

The why of it all? Certainly Bill is no spring chicken (though he has cleverly disguised it for many years). He has reached the stage of life where he does not enjoy meeting deadlines . . . or keeping files in sufficient order to be able to draw from them for column material. To put it in a nutshell, he wants a rest.

We have wondered out loud to Bill if he will be happy not doing his life's work—writing and/or editing for the enjoyment of others—and we have suggested to him the possibility of continuing the column on an irregular basis. He said no, though we remain ready to consider alternatives.

If this column is to be no more, which seems to be the case, we suggest that readers should not mourn its passing. Instead, think of and be grateful for all the pleasurable reading that Bill Winter has provided us for so many years.

Carl Wheeley
Editor and Publisher

Atrix/Michaelis

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tically. Shape the hatch. Groove the underside so that cables can pass over the former. Add the contoured area of the saddle. An optional skid can be set in a slot during construction, or Goldberg wing skids can go in after you finish covering. Drill shallow holes for the rudder cable tubes. Inset and trim flush.

Attach hold-downs temporarily, then make a template from scrap 1/16 ply with holes spaced to match the hold-down taps. Place it into position on the interior bottom, and mark for drilling. Make slots about 1/4 in. long to more easily locate the taps through the fuselage underside.

Shape the fin, then fine sand the fin, fuselage, and hatch using Model Magic filler as needed.

"Tex" covering is excellent for both fuselage and fin. It stretches, shrinks, and wears better than the unreinforced films. Three or four thinly-brushed coats of clear polyurethane on the colored stuff makes it look like a molding. Light fiberglass cloth can be used, too; seam on the bottom and extend it over into hatch and saddle areas. Heat and stretch it like crazy at the nose. Attach 1/16 x 1/4-in. seating tape to finished the saddle.

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Attach the wing, and fit the hatch under it. Make fairings to merge, then cover or paint. Later, you can remove the covering under the spot where you will attach the fairings and glue them to the wing.

Tail surfaces. Cut the rudder blank. Using 1/16 ply to shim, drill a 1/8-in. hole for the nylon tube from the Goldberg 3/32 strip aileron hinge set used for the U. Make the "T" as detailed on the plans. File exposed threads off the stud so they slip into the tube, and sand to a nice airfoil with the fin. Butt-fit at the hinge line (see text below on the Z hinge). External Z hinges made from clear covering or 3M vinyl tape also work and secure well.

Cut the stabilizer halves to planform, then butt to the fin to locate the tubes. Cut slots to be faced with 1/64 ply. Fit a 1/8-in. strip of 1/16 ply between the facings and flush with the stab bottom. Lay in a 1/8-in. O.D. tube and tack with CyA. Slip off, then secure well with CyA, epoxy putty, and a strip of 1/8-in. ply on top. Repeat for the 1/16 wire, tacking tubes with halves in the same plane, then securing well. Centers can be optionally removed and the balsa strips notched in for ribs. Shape to a symmetrical section, thinning toward the tips.

The stab servo goes under a bracket, output arm pointing up, pushrod to one side. At the rear former, add a guide around the pushrod to reduce its bending under load. Cables can be run down the finished fuselage from the rear end. At the servo end, knots secure a Sullivan 2-56 threaded coupler. Use metal clevises. Crimp the cables into a T with bits of tubing.

Hidden Z hinges for flaps and ailerons. Install these after the wing has been fine sanded, vacuumed, tacked, and is ready for covering. These hinges are easily made from MonoKote. They are durable, work freely, provide very close fits, and any bow in the leading edge can be eliminated.

To make hinges for the flaps, first cut strips of MonoKote an inch or so wide with which to face the perpendicular surfaces of the flap and adjacent structure. Use a strip of 1/16 metal bar to trim down to for that overlap on both the top and bottom. Apply separate pieces of covering around the ends and adjacent portions of the wing. Trim to 1/8-in. Covering can be applied to these and trimmed flush. Using a straightedge, cut four 1¼-in.-wide strips a bit longer than the flap. Lay one strip, adhesive side up, by the straightedge. Measure the thickness of the flap leading edge, and on the strip mark a reference line slightly less than this height. Tack the top strip at the line, then seal at a table edge, Mark a line along an adhesive side. Cut into 1-in. hinges.

Slip in the U, and tape the flap to the wing. Insert, center, and progressively iron all hinges to the top surface in a checkerboard pattern from the U toward the tip. With surfaces butted and aligned, pull on the hinges to remove slack, and progressively iron to the bottom. Trim to 1/8 in.

Slide the collar onto the U for a straight shot to the output arm. Attach the stud with a nylon bracket hole ¾ in. from the U axis. Manually activate the flaps to see that everything floats freely. Add the rest of the bridges.

Notch the bottom piece to stabilize the rear hold-down. Bend the soft-wire U so flaps are in a plane with each other. Temporarily tighten the stud in the collar setscrew hole at 45° or more rearward. Groove the rear plate to permit up-flap. Fit the link to the output arm. With the trim tab in neutral, adjust link, bracket on stud, and angles of stud, output arm, and servo throw to get near 90° down as the transmitter stick moves from top to bottom. Use the maximum adjustments available mechanically rather than extreme pot adjustments. Solder the collar and stud in place. If you have a programmable pushbutton for the flap, adjust for ½ in. or so of up.

Covering. Wing and flaps are covered simultaneously. While it can be done in one piece, you may want a different color on the bottom, and covering with two pieces is actually simpler. Cut a 11½-in.-wide piece to fit over the top with about ⅜ in. of overlap around both leading and trailing edges. Attach the aluminum L portion of the hold-down. With the wing inverted, tack the

covering along the leading edge break, but don't iron down the overlap. Turn the wing right side up. If the tack looks straight, iron the covering all along the break, then to the wing adjacent to the inboard flap ends. Slit the covering there.

Drop the flap to make a ⅛ to 3/16-in. space along the hinge line. Pull the covering around the flap trailing edge, tack, and iron to the trailing edge underside, working out wrinkles and slack. Tack at the end caps, then progressively slit, pull around cap, and overlap on the bottom. You can remove most of the slack with the heat gun; then iron the covering to the hinges. Center a straightedge along the gap and slit. Trim the excess, taking care not to cut the hinges. Slip the bottom covering in under the top, tack, then iron down the overlap. Repeat as for the top, but trim at the cap edge. Puncture at the setscrew location. Protect the seal along the hinge line with cardboard while using the heat gun for final shrinking. Push the U wire well into the tubes, and secure it with Zap.

Install the hold-downs with a ½-in. hex-head tempered bolt at the front and a ⅜-in. one at the rear.

Tips and ailerons: Attach facing strips and trim to 1/16 in. as for flaps. Strips for hinges should be joined on a taper. On the hinge strip, first cut a piece to fit, then make four hinges from the root to the Swingee. Before cutting the remainder, number progressively at 1-in. spacing on the adhesive side. The next hinge is outboard of the Swingee. The gap will be very narrow toward the tip, so slit with special care.

Setting up. Balance out 3½ in. rearward of the leading edge. The stab should be set so that there is about 5/16 of throw each way at its leading edge. Set it to align with the fuselage top in neutral (slight positive incidence).

Make sure washout is equal and at least ¼ in. The ship will not stabilize in a flat, level glide without it.

Set the inboard aileron throw for at least ½ in. without any reflex up in neutral. Very little down (3/16 or less) is needed. Too much causes adverse yaw and tip walk masquerading as a need for more nose lead or a bigger vertical tail. Avoid excess servo rotation which will reverse down aileron. Set any coupled rudder for ½-in. maximum deflection.

For starters, adjust the mixer to get ⅛ in. of motion up at the stab front as flaps go from neutral to full down.

Meticulously follow the settings and recommendations below for initial flights.

—Go easy in tightening the hold-down bolts.

—Hand test-glide with the flaps in neutral, and adjust the stab linkage for a level glide.

—Tow first without flaps. After release, let the ship have its head to build speed and flatten out. Give down trim to keep it boring ahead. A lot of sky can be covered and little stick input needed to maneuver when you get this set right. To cruise slowly, trim in a little down flap rather than holding the nose up. Do some turns and get familiar with it. Hold it in a 15° to 20° dive and release the controls. If it balloons, balance farther rearward and retrim the elevator. If it tucks, add lead and up-trim. Get it to stay put or with very gentle automatic pullout if you prefer. Check the effect of low rate.

—Check effect of flap/elevator mixing *only* at safe altitudes. Don't slam in down flap or it will stall even if the mixing is correct. Ease in and out of flap slowly. Fine-tune so that when full down is eased in you will have a descent attitude you like. Gears can strip if flaps are down in a dork or you hit uneven turf, so neutralize or use pushbutton before contact and to act as spoilers.

—When mixing is right, ¼ to ⅜-in. down flap dramatically steepens the tow. Up elevator can be applied when airspeed is adequate. Neutralize flaps just before release. When you've become familiar with how it tows, go for the zoom. The pushbutton can be used to impart up flap briefly and increase zoom speed.

If you can't find clockspring steel, for two pieces send $1.00 with a pre-addressed heavier envelope with 39¢ postage applied to: Harley Michaelis, 26 S. Roosevelt, Walla Walla, WA 99362.