

STROKER

Our author is a master of the RC sport design, and this one exemplifies his art of creating a practical model that is rather easy to build, has pleasing lines for its simplicity, and best of all flies great. The plane takes a .40 four-stroke engine and four-channel controls. ■ L.F. Randolph

THIS DESIGN is the result of an effort to match an airplane to the beautiful .40 to .45 four-stroke engines now available at reasonable cost. I feel the match is a good one.

Although there are many excellent kits on the market that will do quite well with the four-strokers, it seems a shame to

couple these engines to the mundane, for they have a personality all of their own. Stroker tries to capture the romance of open cockpit flying and combine it with the four-stroke personality to produce an efficient flying machine. It does just that. This is an airplane that will perform with the best

of them and still be gentle enough for those of us barely out of the learning stage.

You can expect Stroker to fly as smoothly as a well-trimmed Pattern bird, but at a slower



ER

pace. It will do nice, round loops, smooth rolls, knife-edge flight, point rolls, or what have you, and still land almost without help. Aileron control is solid well into the stall, and

With the four-stroker chugging away merrily, the Stroker makes a low, slow flyby for the camera. You could use a two-cycle, but the sound wouldn't be as pleasing, and a bigger fuel tank would be needed for the same flying time.

snaps are something that must be done deliberately. The conventional gear is every bit as easy to handle on the ground as a tricycle one, and it performs much better on grass fields.

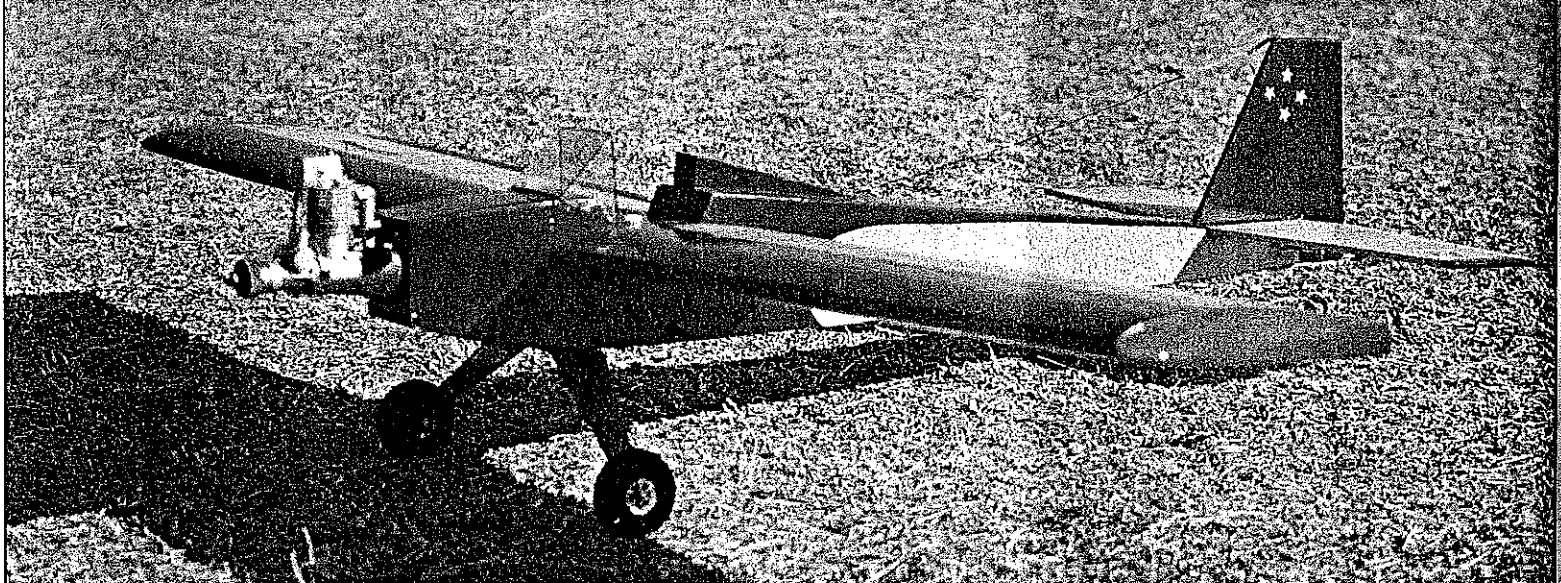
If you don't as yet have a four-cycle engine and happen to like the looks of Stroker, it will also be quite happy with any of the hot .25 to sport .40 two-cycles, but you will have to install a 6- to 8-oz. tank to achieve the same flight time from a single filling. The construction is not ultra-simple, but it is not terribly difficult.

FUSELAGE. Slice the sides from opposite ends of a sheet of $\frac{1}{8}$ -in. balsa 9 in. wide, formed by edge-gluing three sheets of $\frac{1}{8} \times 3 \times 36$ together. Epoxy the $\frac{1}{16}$ plywood doublers to the inside of both sides; tape the sides together, and sand them to the same outline.

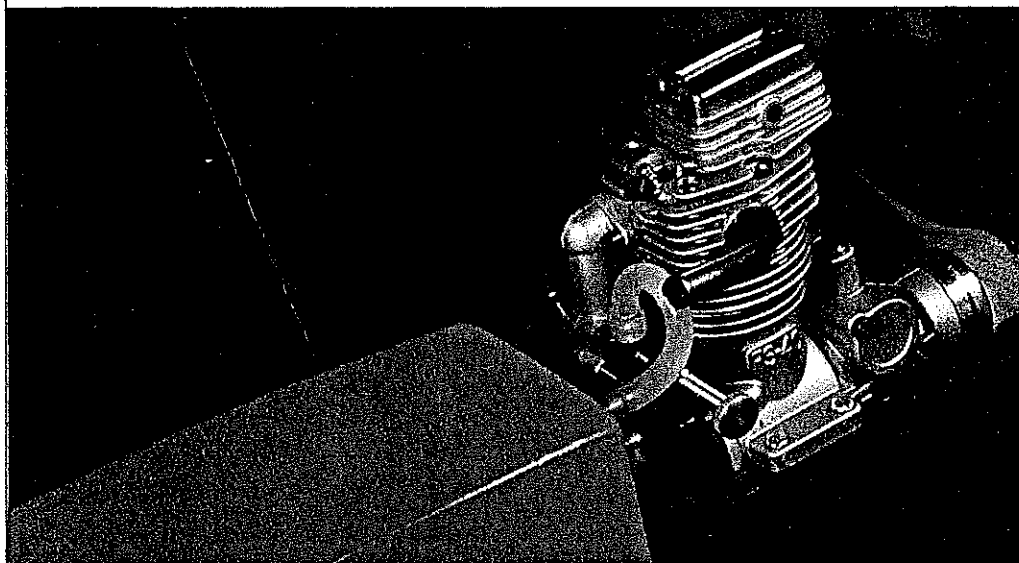
Separate the sides, and mark the locations of the formers on both sides. Glue on the longerons and uprights, as well as the servo rails and tank mounts. Re-tape the sides together, and again sand to the same outline. While they are still taped together, drill the $\frac{1}{4}$ -in. dowel holes, and cut the front and rear cockpit fairings from the sides at the former locations as shown. Save these fairings until later.

Cut the two cabin formers from $\frac{1}{8}$ plywood, and glue them in position on one of the sides. Use a triangle to assure they are perpendicular to the side. Glue the other side to the formers right over the first, and again use the triangle to make sure they are aligned with each other. Cut the firewall from $\frac{1}{4}$ plywood, and drill it for the engine mount and lines for fuel and throttle. Epoxy T-nuts to the back of the firewall for the engine mount bolts, then glue the firewall in place. Bevel the sides at the tail; pull them together and glue.

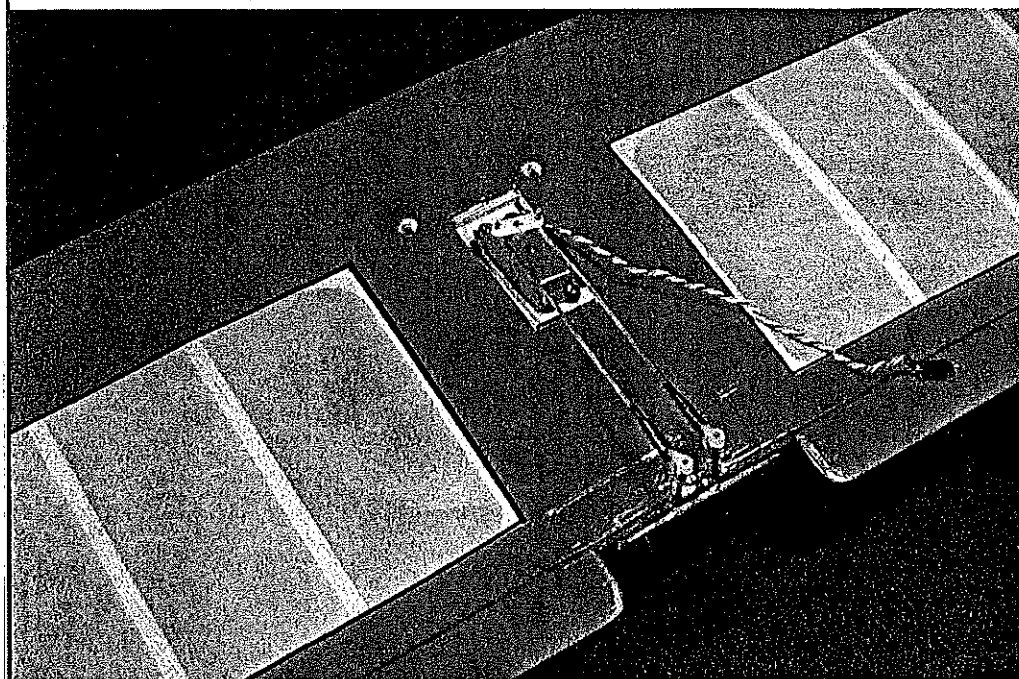




It looks like it's ready to go, and it goes very nicely—as smooth as a well-trimmed Pattern ship but slower. If you're new to four-strokers, you may feel on your first flight that the engine isn't running fast enough to fly the plane. Please fear not. Really, there's plenty of power.



The fuel and overflow lines to the tank are side-by-side. The fuel line is connected to the engine with plastic tubing. The overflow line can be used for exhaust pressure to the tank.



The aileron servo is mounted in a plywood tray which is glued to 1/4-in. balsa risers in the servo well. The airplane is covered with Micafilm, trimmed with MonoKote. Pix by author.

Cut the landing gear mount from 1/4 plywood, and glue it in position against the front cabin former—flush with the bottom of the fuselage. Install the inner Nyrod throttle line and the Nyrod guides for the elevator and rudder. The tank compartment floor is 1/2 balsa and should be fitted and installed at this time. If nylon bolts are to be used for wing attachment, the hardwood anchors should be glued in position on the fuselage sides. The glue joints must be good ones, so clamp them well while the glue sets.

Start the bottom fuselage sheeting with the 1/8 plywood over the landing gear mount and at the tail wheel location; finish with the cross-grain 1/8 balsa. Install the fuel tank and lines, and complete the top sheeting. The headrest will be finished later. Sand everything.

Tail surfaces. Cut the two spar doublers 1/4 in. wide and 10 in. long from 1/8 plywood. Laminate one of the doublers to the center of the stab trailing edge spar, and notch the other at the center so it will form easily to the shape of the leading edge. Assemble the stab right over the plan by pinning down the trailing edge with its doubler, then adding the center sheet, the other ply doubler, and the leading edge. The ribs are cut to fit between the leading and trailing edges. Don't forget the gussets at all corners, as they are important to prevent wrinkling of the covering at these spots.

Remove the stab from the plan, and sand it smooth. Round the leading edge and tips, and sand the edges of the trailing edge just enough to remove any sharpness.

Cut the elevator from 1/4-in. sheet balsa. Before making the cutout in the trailing edge for the rudder, inset the 1/4-in. hardwood dowel at the center of the leading edge. Tape the elevator to the trailing edge of the stab, and sand both to match. (The fin is built the same as the stab, and the rudder is similarly matched to it and sanded.) Where the 1/4-in. elevator dowel carry-through meets the rudder, sand a 1/2-in. half-round in the rudder for clearance. Harden the areas where the horns will be

mounted on both the elevator and rudder with Jet cyanoacrylate, and sand all surfaces smooth. The gussets can be sanded to a concave section with a 1/4-in. sandpaper-wrapped dowel.

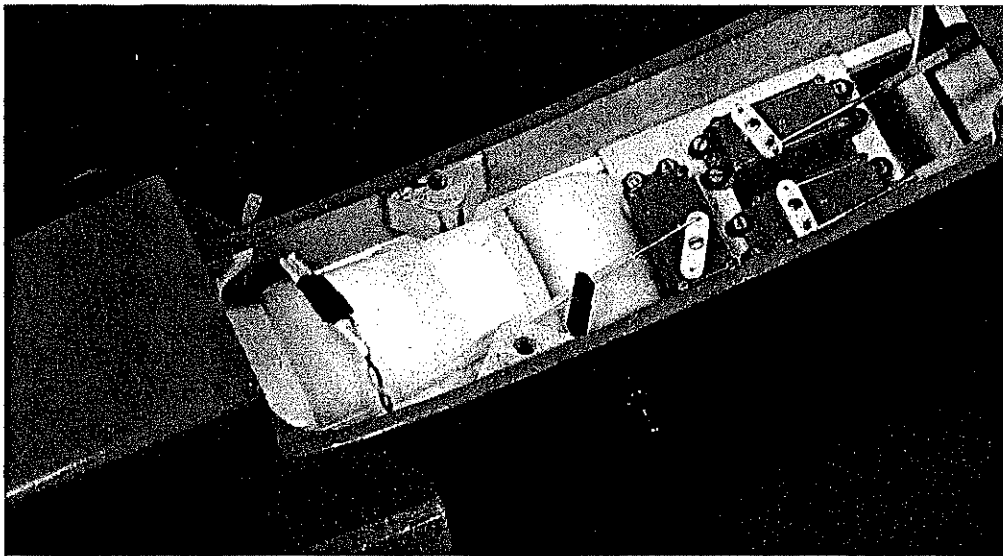
Wing. Cut the ribs from rather hard 1/8 sheet balsa. The ideal way to accomplish this is by hand-sawing a stack of blanks. The airfoil is semi-symmetrical, meaning that the trailing edge should be elevated when the wing is built—1/8 in. at the front edge of the trailing edge sheet and 1/2 in. at the back. A 1/4-in. plank of balsa with a piece of trailing edge stock pinned to the top of it is ideal for a jig.

Attach this trailing edge support to the bench, and lay the plan over it so it coincides with the trailing edge on the plan. Then build the wing as if it were a flat-bottomed surface. Pin the major spar flat against the bench and the trailing edge sheet over the support. Add the ribs. Do not put in the center ribs at this time, but start with the next-to-center rib. Usually I add the shear webs as I go along, but they can be added after the ribs are in place. Glue the 1/4 sq. strip at the back edge of the trailing edge, and add the top spar and leading edge. When the glue has set, remove the wing from the bench, and build the other wing half in the same manner on the back of the plan.

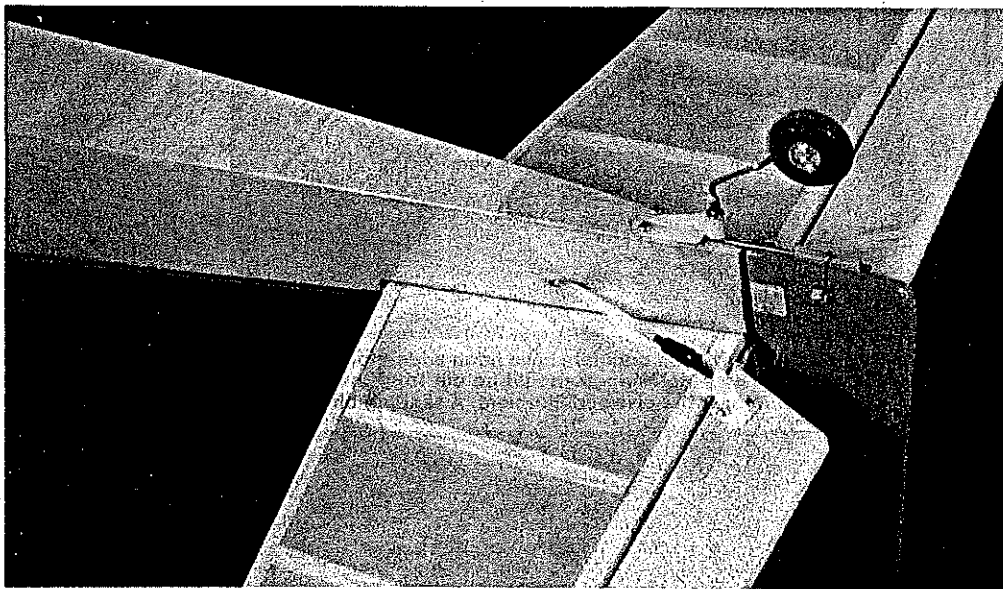
When both wing halves are complete, bevel the spars and leading and trailing edges at the center to match the dihedral angle. Join them with Super Jet. These are butt joints and not very strong, so be gentle with them. Trim 1/8 in. from both sides of the spar notches in the two ribs closest to the center for the dihedral braces. Glue these braces in place as well as the one at the trailing edge. Sand the leading and trailing edges to blend into the ribs so the sheeting that follows will flow smoothly over them.

If dowels and rubberbands are to be used to hold the wing to the fuselage for flying, the following steps do not apply. If 1/4-in. by 20-thread nylon bolts are to be used, there are a few more things to be done at this point. Place dowels in the holes you previously drilled in the fuselage, and strap the wing to the fuselage with rubberbands. The spar should pass exactly over the hardwood pads glued to the fuselage sides. Drill through the spars and the pads with a 1/8-in. drill. Be careful to prevent the drill from touching the plywood dihedral braces on either the top or bottom spar.

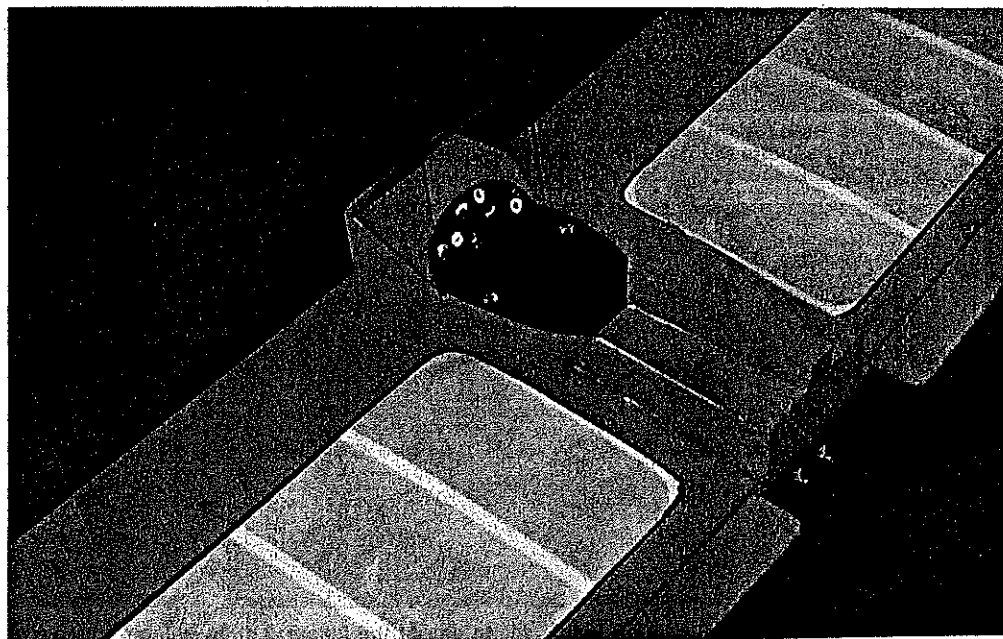
Remove the wing, and enlarge the holes through the spars with a 1/4-in. drill; again, the drill should just graze the dihedral braces. Glue the additional 1/8 plywood braces on both sides of the spars at the center. Thread the hardwood pads with a 1/4-20 tap. Temporarily mount the wing on the fuselage with the nylon bolts, and check the fit. Remember that there will be a layer of 1/8 balsa added to the top and bottom of the wing where it fits into the saddle.



There is lots of room for the radio and servos in the fuselage. Batteries and receiver are loosely wrapped in foam, held with masking tape. Antenna exits the fuselage via a section of fuel tubing on the side opposite from the switch. Airplane is straightforward throughout.



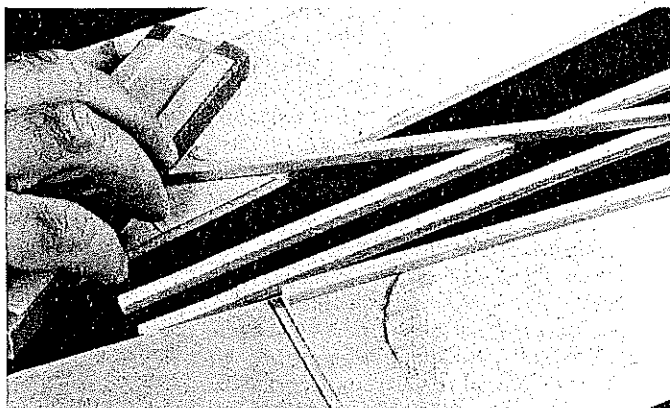
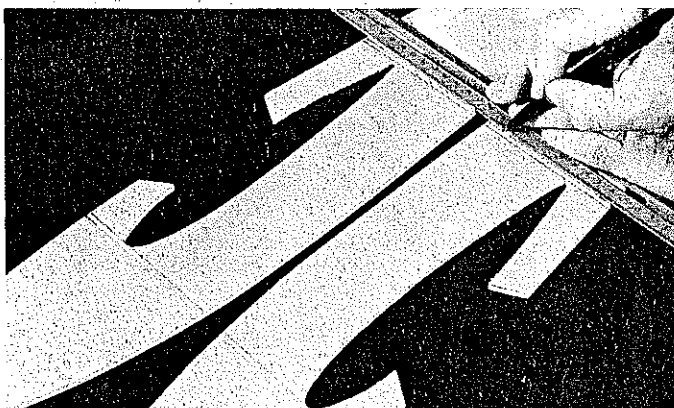
The tall wheel is steered by a tiller attached to the rudder. This cuts down movement of the wheel and makes taxi control much less sensitive. Fuel tubing acts as a shock absorber.



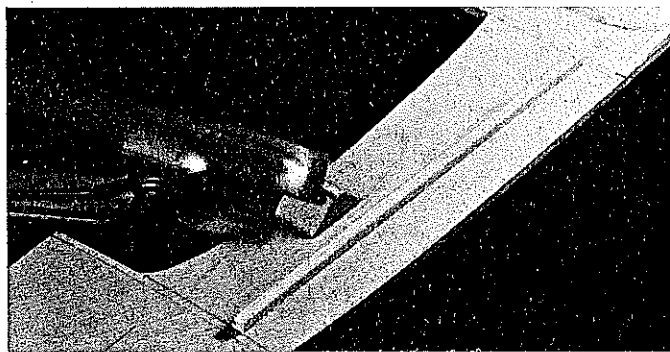
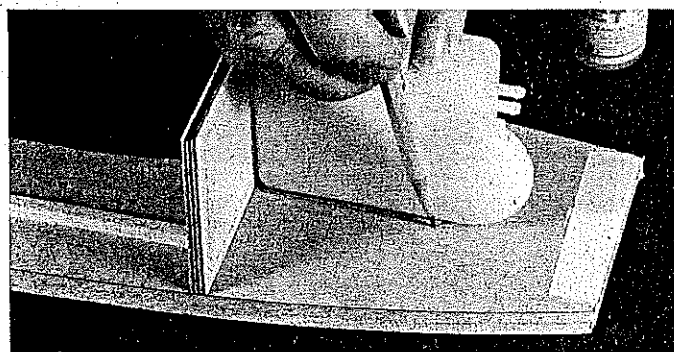
Windshield, cockpit, wing fairings, and headrest detail. Instruments are cut from white MonoKote with a paper punch. They're ironed in place and marked with a Sharpie pen.



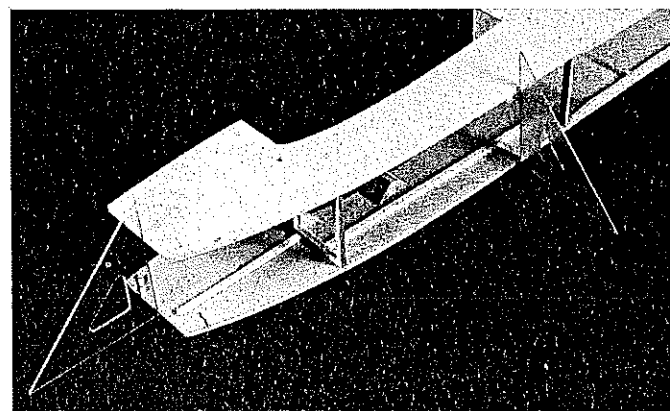
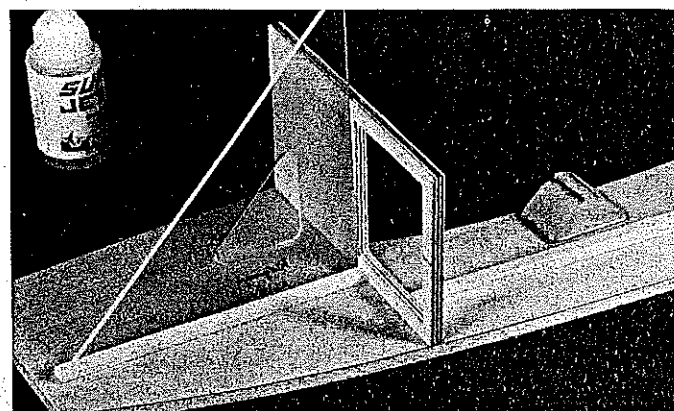
It's easy to see from this picture that the author's idea was to capture some of the romance of the open cockpit era of aviation. The model performs with the best of them and still is gentle enough for anyone who is barely out of the basic learning stage of RC flight.



Left: After the plywood doublers have been added to the fuselage sides, mark the bulkhead locations on the inner sides of both. What will become the wing fairings should be cut from the sides, along the bulkhead lines, at this time. Right: The longerons should be notched to fit over the plywood doublers. A sanding block with a square edge is a good tool for this, and it makes the job an easy one.

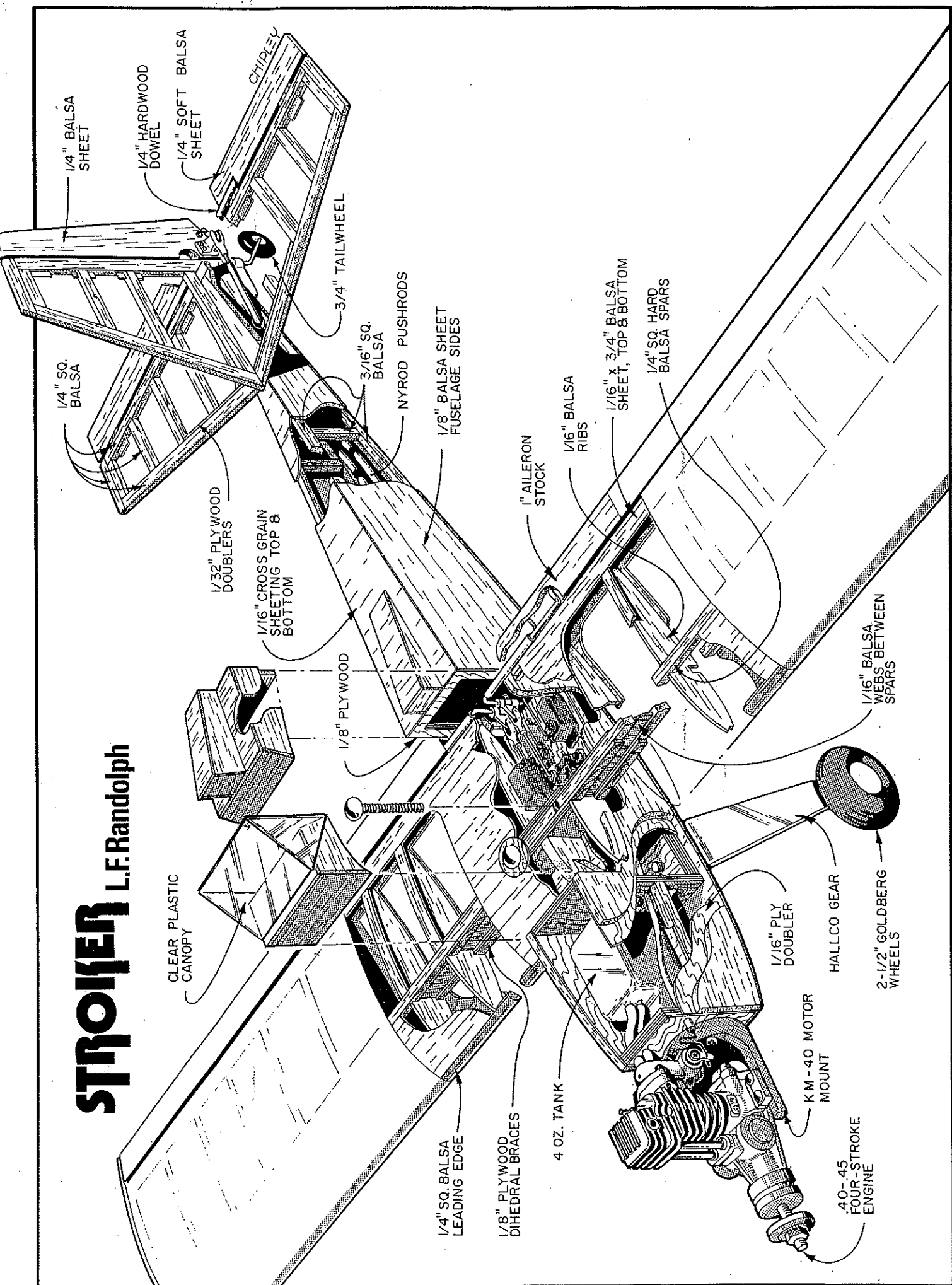


Left: Hold the front bulkhead (F-2) in place, and mark the location of the fuel tank on the side. Allow for a 3/32-in. floor, and glue the tank supports in this location. Right: Glue the hardwood wing mounting pads to the fuselage sides. As this must be a good, strong joint, use epoxy glue here. Recommendation: clamp the pieces securely to force the glue to penetrate both the pad and the fuselage side.



Left: Glue the F-2 and F-3 bulkheads to one of the fuselage sides using a triangle to assure vertical placement. Here, the tank supports and servo rails have already been installed. Right: Glue one side directly over the other side, again using the handy triangle for alignment. Next, bring the fuselage sides together at the tail, and glue them. After this, it's time to drill and mount the firewall (F-1).

STROYER L.F. Randolph

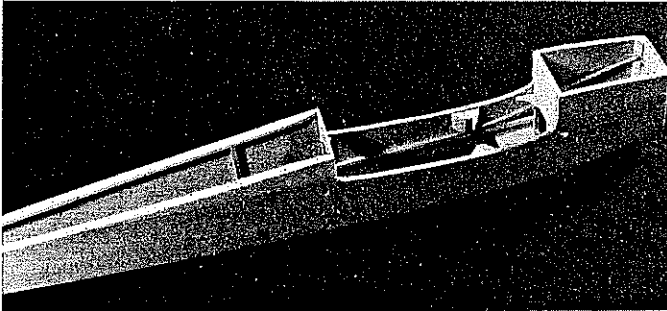


Measure $\frac{1}{8}$ in. in front and aft of the spar notches in the two remaining ribs, and slice them so they will fit in front of and behind the main spar. Glue the two fore pieces together, and install them at the center of the wing. The aft sections of the ribs are glued between the spar and trailing edge—far enough apart at the center for your servo to fit between. Finish the servo well with an additional piece of $\frac{1}{8}$ balsa between the ribs.

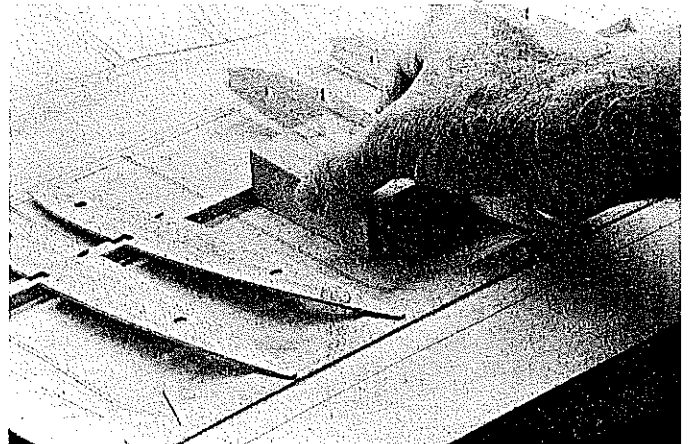
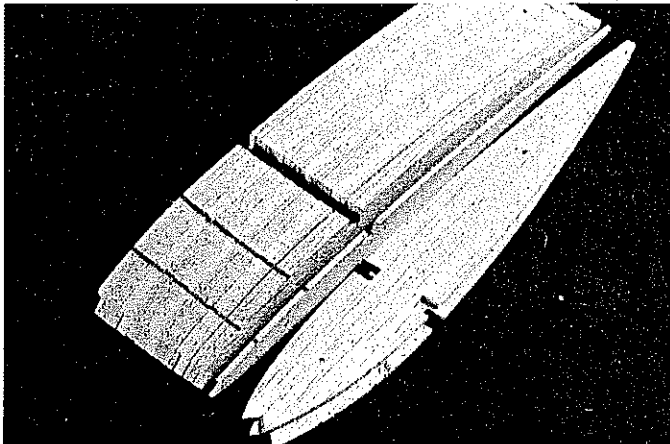
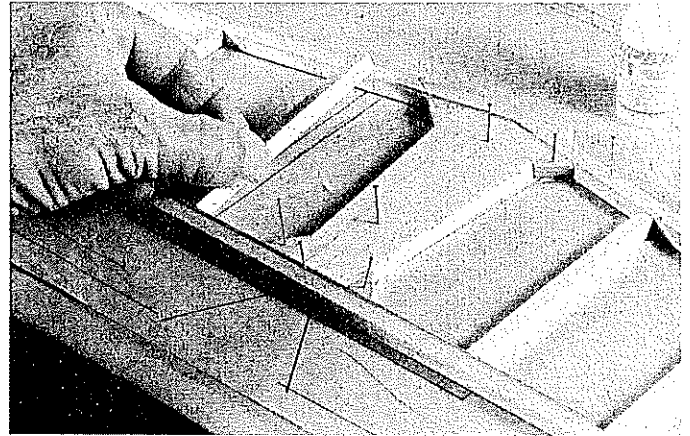
There are several ways to apply the leading edge sheeting to a wing. Probably the quickest is to use one of the slow-

setting cyanoacrylate glues, like Super Jet. Run a bead of glue along the spar, each rib, and the leading edge. Position the sheet, hold it in place, and shoot it with X-Cel. The cap strips and center section can be done in the same way. Apply the bottom sheeting first; when secure, drill through the bottom sheeting at the bolt holes in the spar (before the top sheet is added). Inlay circles of $\frac{1}{8}$ plywood over the wing bolt holes in the top of the wing, and drill through them from the bottom. Glue the wing tips in place. Sand the wing all over.

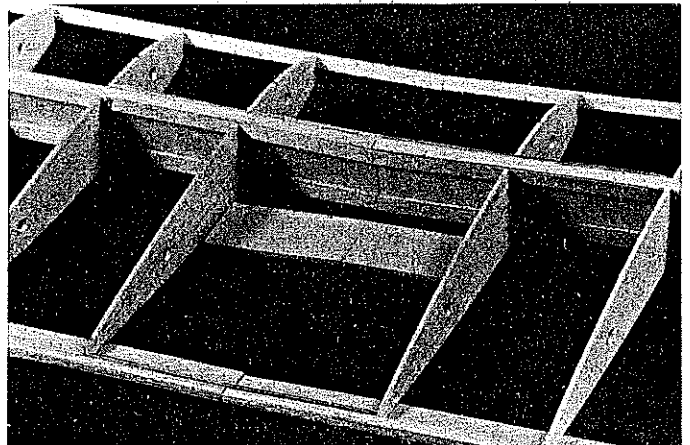
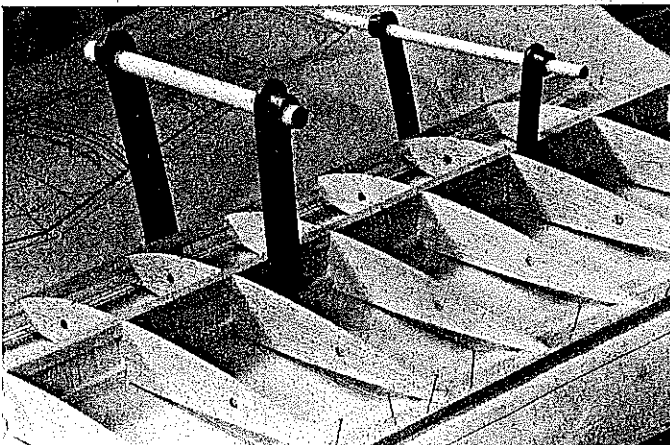
Mount the wing on the fuselage, and glue on the fairings (cut from the fuselage sides) to the wing center so they match the fuselage. Sheet the top of the fairings, which will be the cockpit, and sand them to blend into the top of the fuselage. Remove the wing, and add the front and back sheet to complete the fairings. The headrest is built as shown; part of it is glued to the wing fairing and the rest to the fuselage. Bend and assemble the aileron torque rods; epoxy them at the trailing edge. Cut the ailerons from tapered stock, and fit them to the wing.



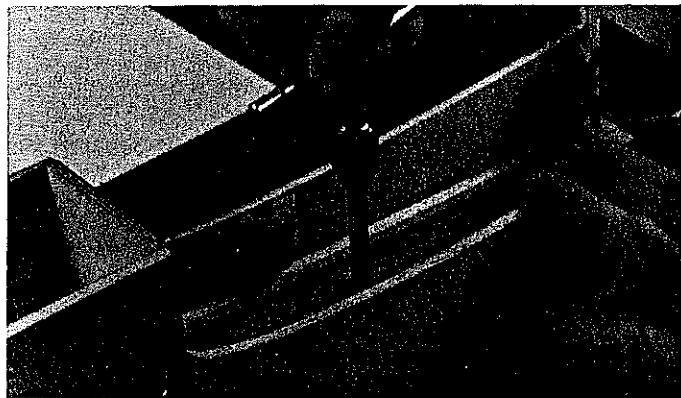
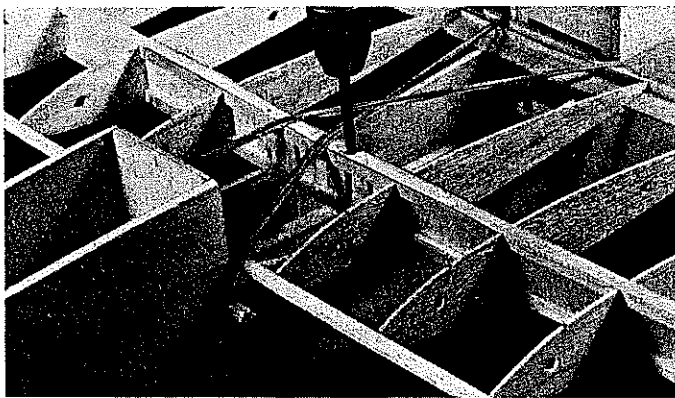
Above: The fuselage is ready for gluing the landing gear mounting pad to the bottom and installing the Nyrod guides for the rudder and elevator. Throttle and fuel lines should also be attended to. Right: Build the tall surfaces over the plan. Gussets can be sanded to a smooth concave shape with a sandpaper-wrapped $\frac{1}{4}$ -in. dowel. Don't forget to put in the plywood spar doublers in the elevator.



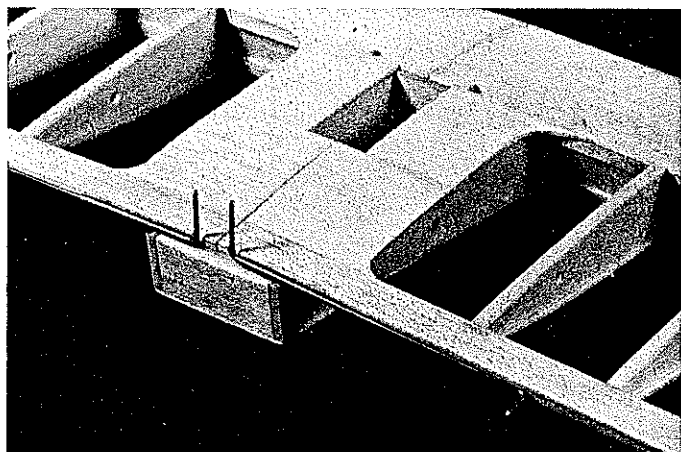
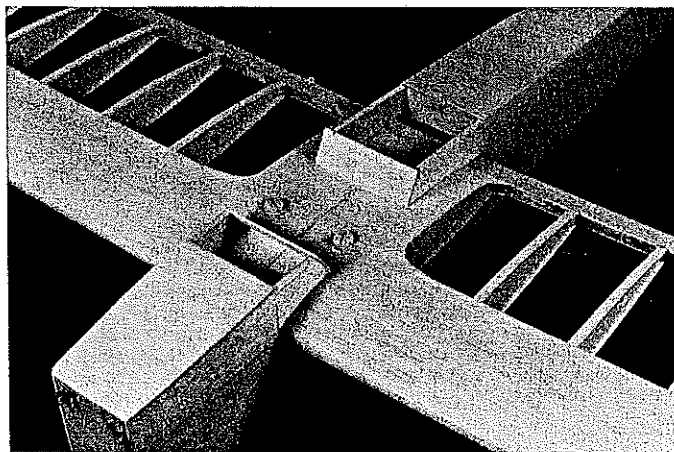
Left: After the wing ribs are cut out, they should be marked to avoid possible later confusion about which is the top and bottom. Right: Place a shim as described in the text under the plan at the trailing edge so the wing can be built over the plan in the same way as one with a flat bottom. Pin the bottom main spar and the trailing edge sheet to the plan first. Wooden block helps with vertical alignment.



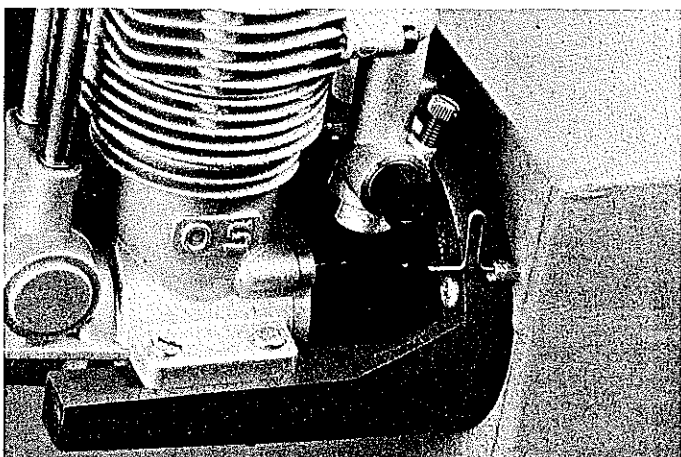
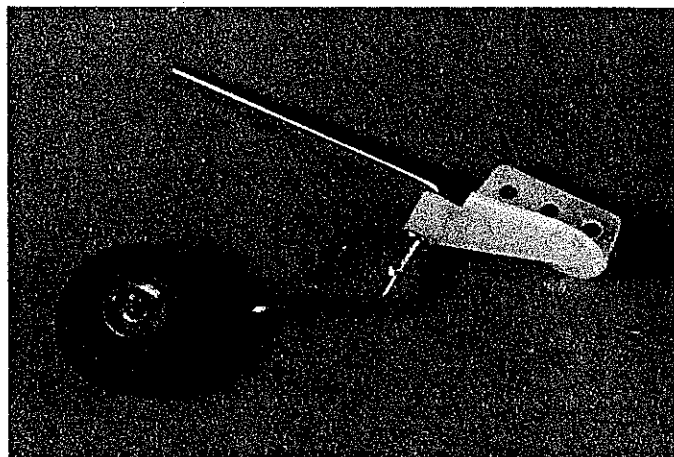
Left: While the wing is still secured to the plan and workbench, add the top main spar and leading edge. The Master Clamps in the picture (from Full Command Systems) are useful in this application (and many others). Right: The wing halves have been joined with dihedral braces. Notches in the ribs at the spar have been enlarged enough to accept the braces. Additional plywood doublers are now glued at the center section. These ply doublers should be installed even if rubberbands are used for holding on the wing instead of nylon bolts.



Left: With the wing securely held to the fuselage, drill through the wing spars into the hardwood pads of the fuselage. Make sure that the wing is exactly in the right place before beginning to drill. The drill shouldn't touch the dihedral braces on either side. **Right:** Tap holes in the hardwood pads to accept 1/4-20 nylon bolts. (This step isn't necessary if the wing is to be mounted with dowels and rubberbands, but the author feels the bolt-mounting system is well worth the extra effort, especially at clean-up time after a flying session.)



Left: After the wing is sheeted, the fairings are built onto the center section. These are the pieces that were earlier cut from the fuselage sides. The fairings should be finished with 1/16 sheet balsa to match the rest of the fuselage. Build the headrest in the same way. **Right:** Alleron hardware is assembled and bent to shape, then the bushing is glued to the wing trailing edge. Sand notches in the trailing edge to clear the torque rod arms at the center of the wing. The torque rods should work smoothly in the bushings made of brass tubing.



Left: A stock tail wheel mount has been modified by clearing away a portion to make room for a tiller to extend back to the rudder. **Right:** A loop is bent into the throttle line (florist's wire) to act as overload relieve for the servo (and for easily adjusting the throttle position).

They will be installed when the wing is covered. Sand the finished wing with 400-grit sandpaper, and go over the whole airplane with a tack rag to remove any balsa dust.

The original model was covered with Micafilm and trimmed with MonoKote. The areas to be covered with Micafilm should be given a coat of Balsarite; in fact, a coat over the whole airplane is recommended. Follow the instructions that come with the covering material you use. I like to give the firewall a coat of epoxy after the fuselage is covered to seal all areas around the engine. Hinge the con-

trol surfaces, and check for free movement.

Final assembly. The landing gear is mounted with two 1/4-20 nylon bolts just like the wing. Drill the landing gear, then the gear mount, with a 1/16-in. bit. Tap the holes in the gear mount, and enlarge the holes in the gear to 1/4-in. Cut the nylon bolts so they are just long enough to extend about 1/8 in. above the inside floor of the fuselage. The wheels are held to the gear legs with 4-40 bolts through 1/8-in. brass tube axles. Use washers on both sides of the wheels, and secure the axles to the legs with lock washers under the nuts.

Trim the tail wheel bracket as shown, and bend the axle from 1/16-in. wire. Install the tail wheel with solder and washers, then glue and screw the tail wheel and bracket to the fuselage. The steering arm is secured to the rudder with a U-shaped piece of .030 wire held with a 2-56 bolt and nut. Slip a piece of fuel tubing over the steering arm as a shock absorber between the arm and rudder.

Mount the engine, and connect the fuel and throttle lines. Make a plywood tray to hold the three servos. After installing the battery and receiver, mount the servos on

Continued on page 140

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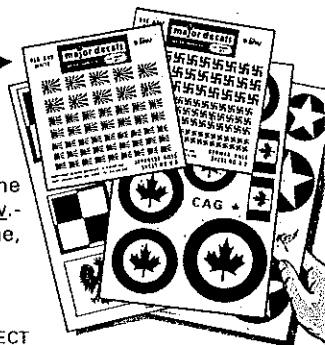
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Doug Pratt of the AMA HQ staff has been hooked into the two major information services, CompuServe and The Source, for a few months. He is maintaining information on all sorts of modeling stuff, printing news bulletins, running conferences, and answering electronics mail. He finds many modelers who don't know about AMA. Anyone who owns a home computer and subscribes to either of these outfits can reach AMA through them. The AMA address is 70020,224 on CompuServe and ST6232 on The Source.

Me? Right now, I'm in the year 2001—or is it 2010? You can reach me in the old-fashioned way. Pencil, ball-point, type-writer—I'm fully equipped (pre solid-state) to interpret anything. Some names are squiggles. Perhaps writers should print those.

Anyone for ROGs?

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

Book/Winter

Continued from page 25

ployed (no staples). This issue has 193 selected, fine photos, some 77 of which were collected by Clapp for his "bible" on Fairchild's.

My purpose, and I have waited for years, was to tell you about this Clapp coverage. But when I obtained an example from Matt, I found that Col. deVries—a retired Air Force officer and an expert Scale modeler who writes a column for RCM these days—covered the Standard story from Charles Day's 1910 biplane at Cicero Field in Chicago, through the Hisso-powered Jenny look-alike, the J-1. The J-1 was a better plane than the Jennie, but it was bedeviled in WW I by a different, lousy engine. With the Hisso, the J-1 proved to be much favored by early barnstormers. I knew Charlie Day, who had

barnstormed with Glenn L. Martin when I was a babe in arms. Charlie produced Curtiss Hawks in China before and during the China-Japan war before WW II. I interviewed Charlie for the old *Saturday Evening Post*, and spent three solid weeks with him at the old Lafayette Hotel on lower Fifth Ave. He was accompanied by his wife, who had flown around the world with him in a biplane of his own design.

Charlie was a major figure later during WW II at Martin-Marietta and then headed Canadian aircraft production. deVries and Matt tell and show things that enthral me. And, also, Vol. 17 contains equally good coverage of the Cessna Bobcat, the Consolidated PB-5A Catalina, and on USAAF pilot training in WW II. This is not superficial stuff. The PB-5 story, for example, includes 57 photos and three pages of drawings; the plan view is a double-size fold-out sheet.

I don't just recommend this book—I hope you are not foolish enough to miss it. It is far underpriced at \$10.00. (You can still get Vol. 15 and 16.) I suggest you send the required 50¢ in stamps or coin for Matt's latest illustrated catalog: The Historical Aviation Album, P.O. Box 33, Temple City, CA 91780.

Bill Winter

Stroker/Randolph

Continued from page 38

the tray, and slide it along the mounting rails until the airplane balances at the point on the plans; glue it in that spot. The aileron servo is also mounted on a plywood tray that is glued to 1/2-in. balsa risers at the front and back of the servo well in the wing.

Hook up all linkages to the servos and surfaces, and check for proper movement. The elevator throw, measured at the trailing edge, should be about 3/8 in. in each direction; the rudder throw should be about 1/2 in. Ailerons should be 3/8 in. up and down, no more. Set the transmitter

trim tabs in the middle of their range when the control surfaces are centered. Range-check the radio after everything is installed.

Flying. If you have never flown a plane with a four-stroke engine before, on your first flight you will feel that the engine is not running fast enough to fly the airplane and be somewhat reluctant to rotate. Fear not. The airplane will leap into the air and fly just as well as any .40-powered sport airplane.

You can expect a very groovy and easy-to-handle airplane. There is little trim change required between upright and inverted flight, and the loops are almost the same in either direction. It is difficult to make the Stroker snap, but at a slow speed with both aileron and rudder at full deflection, it will do so; if control is held, it will spin—reluctantly!

Landings are quite slow and with control through the stall. The conventional gear handles just as easily as any three-wheeler, and it really works well on grass strips.

The beauty of four-stroke flying is not only the great sound, but the fuel goes almost twice as far.

Radio Technique/Myers

Continued from page 41

alert to the possibility of danger. The wary cat checks out the neighborhood before it makes a move. The overconfident cat forgets to check, so it ends up dogmeat or becomes part of the pavement. (Don't send me any cat-lover letters.)

If you would emulate the wary cat, get yourself a monitor and learn to use it properly. Perform some ground tests, when faced with a new or unusual situation. Find out what you are flying into, before you fly. Keep a Sailplane—or an expendable trainer—around. Send it up to test new systems, and to test the air for turbulence, wind shears, RF interference, etc. before you send up something expensive, dangerous, and important to you. (There are certain advantages to letting the other fellow fly first.)

Use an impound area, and insist that others flying with you do likewise. Enforce frequency control by means of clothespins or whatever. Use frequency flags. Frequency flags are the AMA control scheme. You can't be denied insurance, charged a fine, or put in jail for failing to mount the proper flag, or for mounting the wrong flag on your transmitter. But, you can be put out of any AMA activity, including AMA club flying.

On the other hand, don't depend on frequency flags to protect you! There are still too many of those pastel flags around that could be anything (Red? Brown? Orange?). Then, there are the rebels who like their own kind of flag better. Throw in some crystal-swapping (now legal) and module-swapping without changing to the