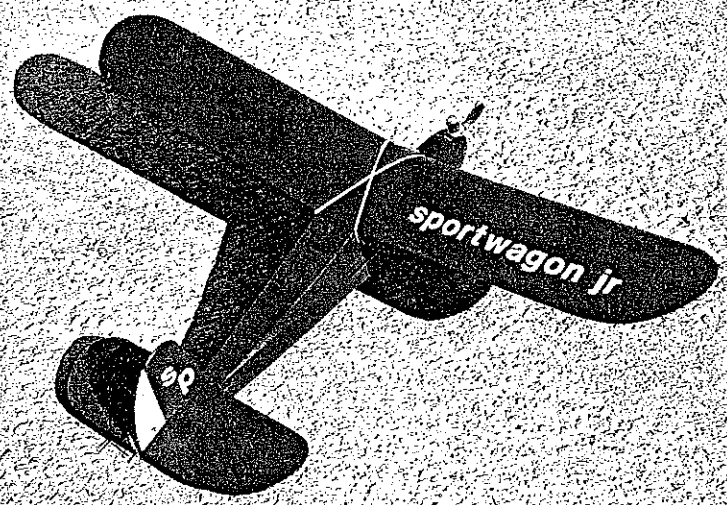
#417

Sportwagon Jr.

This model traces its ancestry to a sport Free Flight model designed many years ago by the late Calhoun Smith. Builds quickly and economically.

RC fun flying in a small package—this airplane is great for that. Uses an .02 Cox Pee Wee engine and rudder-only control via the Ace pulse system. It's basically a FF with radio to keep it where it's wanted. Cabin layout gives appealing looks. ■ Jack Headley

Model is easy to carry even in the smallest of autos. Tail surfaces are permanently attached, but the wing is rubberbanded in place. Lettering is stick-on vinyl.



THE SAGA of this model began many years ago (I was tempted to also say in a land far away). My main interest in modeling during my college years was strictly contest flying with a capital C. Any contest—Free Flight, Control Line, anything. Models were built for only one reason: to win. My model design was basic and functiuonal—no frills, no good looks.

Contest FF Power models of this era were high pylon, low aspect ratio devices, with the latest hot diesel engine up front. Into the latter one pured the most noxious mixture of ether, castor oil, and nitrated something or the other. Although I won few contests (more about that later), it was all great fun.

With this background it's a complete mystery why I built or obtained a Sportwagon. The Sportwagon, for those of you not familiar with the design, was a product of the fertile brain of Calhoun Smith, and the plans

were published in a short-lived magazine in England during the Fifties.

The design was the antithesis of my type of model. It had a cabin(!), wheels(!), and a cavernous fuselage. However, it was a good flier. I used it for both fun and contest work, usually obtaining my consistent one max, out of sight, score. The best-remembered of this type of result was a flight at a contest in Huddersfield, which (as usual) went out-of-sight after a few minutes (the wind always blows in Huddersfield), and finally landed on a golf course in Halifax.

I can't recall what happened to the model in the end (does anyone remember the fate of his or her old relics?); however, a year or so ago, I got the urge to remake the Sportwagon. A friend in Toronto happened to have a copy of the original English magazine, so I prevailed on him to Xerox a copy for me (thanks, Mike). Then I set about scaling it up.

However, as usual, my grasshopper mind took a left turn. Rather than remaking the full-sized bird, I decided to produce a single-channel version to fly in my local park. This single-channel model is the subject of this article.

Someday, however, I'm sure that I'll remake the original. Does anyone out there have an Elfin 1.8 diesel with the tubular tank in the back? I might need one.

Jaunty looks are enhanced by the shaped fuselage bottom and stringers on the sides. Black trim applied along the side and around wind-screen. Uses plastic 1½-in.-dia. wheels.

Construction. The model shown in the plans is not just a scaled-down version of the original. I did quite a bit of redesign work and simplification, though I think I preserved the original flavor of its big brother. My prototype was built very leisurely during a rainy week, using one of the "slow" super glues. It was built primarily for the Ace pulse radio, but there's no reason why a small Cannon two-channel set couldn't have been used (with addition of a small elevator on the back of the stabilizer). However, the following notes are strictly for the single-channel model.

Wing. This is made initially in a single piece, then cut into two halves and re-joined at the correct dihedral angle. Start by pinning down the lower main spar and trailing edge strip onto the plans. Make all the wing ribs in your favorite manner. (I make a hard balsa template, cut them all out quickly, then assemble in a block, sand, and saw out all the spar notches.)

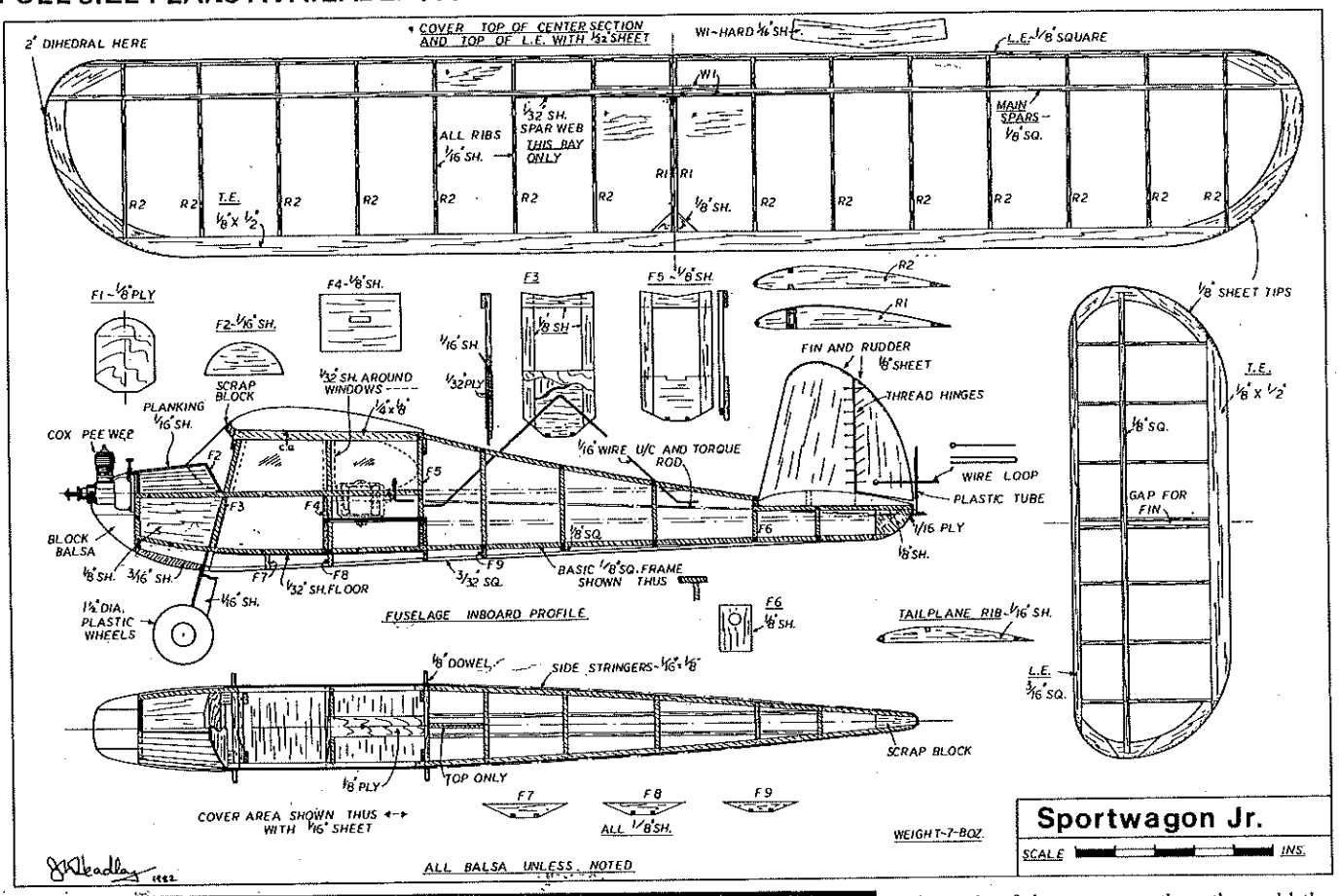
Glue all the ribs into place except the center and tip ones, then add the leading edge strip. The ⅛ sheet wing tips are cut out and added next, followed by the tip ribs and the upper main spar.

Carefully cut the wing in half at the center, and sand the resulting spar ends to the correct bevel. Make the wing joiners from hard sheet.

Re-join the wing pieces. This is done in the following manner. Pin one of the wing halves onto the plan, and find a solid block to prop up the other wing tip; I use a scrap off an old 2 × 4 for this purpose. Move the block around until the correct height is found under the tip, in this case 4 in. Glue

Charming Lisa Headley poses with her father's tiny lightweight RC design. The original was covered with tissue and given two coats of clear dope, followed by two coats of red (except for the rudder).

FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 164

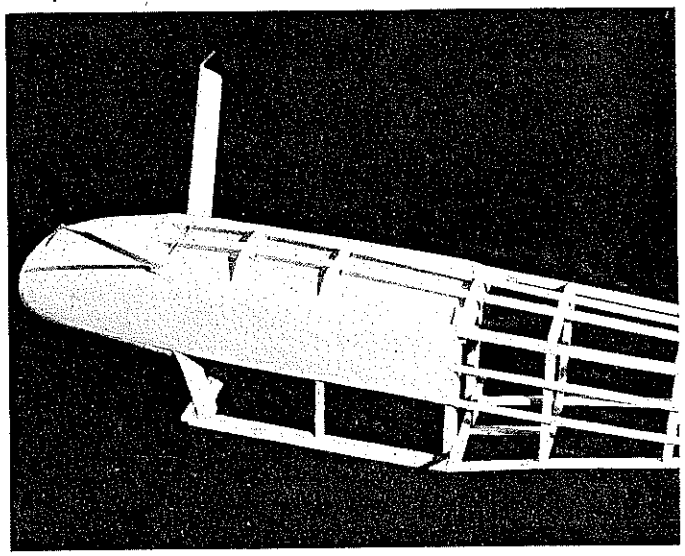


Note that the top spar must be a separate piece at the tip (same with the leading edge sheeting). Tip shape is cut from 1/8 sheet in several pieces, noting the grain direction shown on the plans.

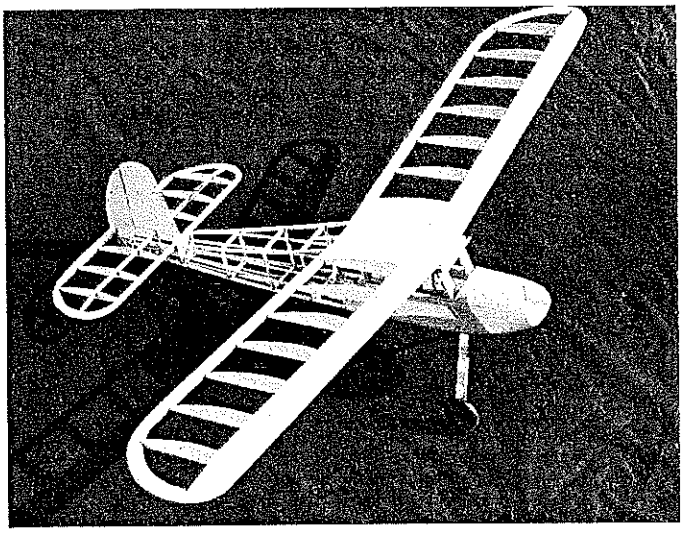
the ends of the spars together, then add the wing joiners; clothespins make handy clamps for this final operation.

The center-section ribs will now need a little modification before they will fit. The 1/32 sheeting comes now, and this is added only to the upper leading edge and the top of the center section. A scrap of this sheeting is used as a spar web in the second rib bay. A careful sanding all over will make the wing ready for covering.

Fuselage. Before starting, let's say a few words about the construction of this particular model and also what the plans show. The basic body is made from two side



Fuselage basically is a box which starts with the two sides made of 1/8 sq. balsa. Landing gear fairings are 1/16 balsa covered with tissue.



Base bones all constructed, sanded, and ready for covering. It wouldn't surprise us if, at this point, you decided on using a more transparent type of covering than the author did.

frames of ⅛ sq.; these sides are emphasized on the drawing with cross hatching. They are joined together with the various frames and ⅛ sq. cross members to make up the basic fuselage box.

To soften the boxy look, a 3/32 sq. substructure is added on the bottom side, and 1/16 × ⅛ strips (shown phantom on the plan) along the fuselage sides. The nose is rounded off with the aid of soft balsa blocks and sheeting. Study the plans before starting to build.

Begin with the ⅛ sq. side frames. Pin the top and bottom longerons onto the plans, the ¼ × ⅛ wing runners, and the lower window longeron. Glue all the various crosspieces into place. When this is dry, make another identical side frame.

The frames come next. F1 is cut from ⅛ ply, and it should be drilled for the engine mounting at this time. F2 is made from 1/16 sheet, and it is slightly bevelled on the bottom edge. F3 is a little complicated, as this holds the landing gear wire in place.

Before making F3, it's necessary to bend the landing gear to shape from 1/16 wire. Cut the top pieces of this frame from ⅛ sheet, then glue together with the 1/32 ply backplate and the 1/16 sheet insert. Make another 1/16 sheet insert, which this time is cut away to trap the gear wire in place. Add this sheet, together with the wire, and epoxy into place; follow with the 1/32 ply top cover.

Frame 4 is a piece of ⅛ sheet with a central slot for the ⅛ ply actuator support. Frame F5 is built up from ⅛ sheet, and F6 is ⅛ sheet.

Join the two fuselage sides with all these frames, and then add the ⅛ sq. cross members as shown. The sides are joined at the rear with a scrap block of balsa. Fill the side frames between F1 and F3 with ⅛ sheet, then add F2 and the 1/16 top and side sheeting (shown with ▲-▲ on the plan). Follow this with the 1/32 sheeting on the cabin floor.

Make F7, F8, and F9 from ⅛ sheet, and glue them into place followed by the 3/32 stringers. Add the 1/16 × ⅛ strips along the side. Soft balsa blocks around the nose and 3/16 sheeting on the bottom finish off the basic body. Sand the nose contour to a pleasing shape. The ⅛ ply bridge (the actuator support) finishes off the basic fuselage.

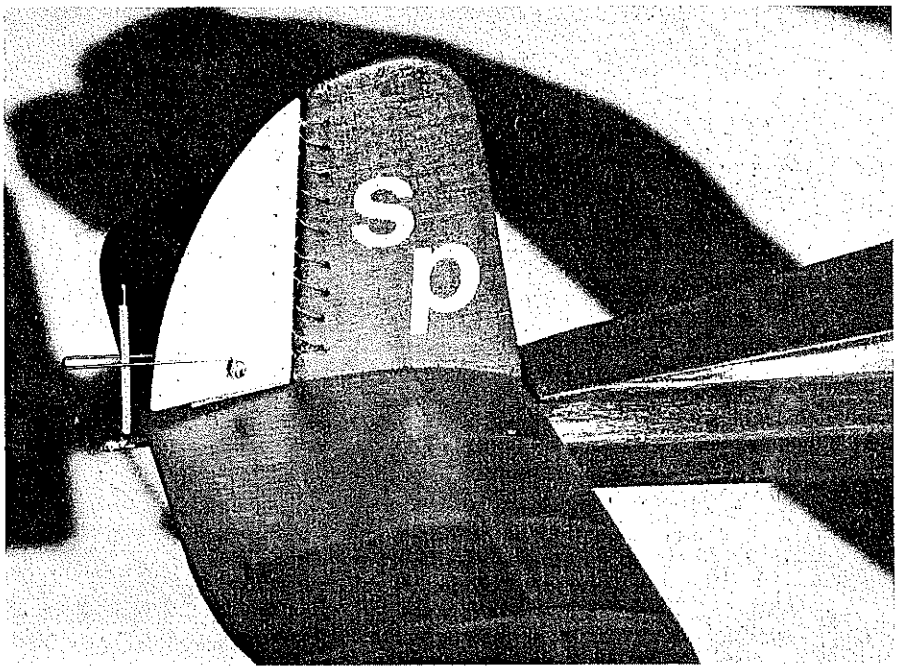
After gluing on the celluloid windows, 1/32 balsa sheeting is glued on top to widen the window frames and to produce the rear window shape. A scrap block of balsa across the front of the windscreen top helps to support the celluloid. Trim this block to shape with the wing in position.

Fairings of 1/16 sheet balsa are glued to the landing gear wire legs. Cover them with tissue for additional strength.

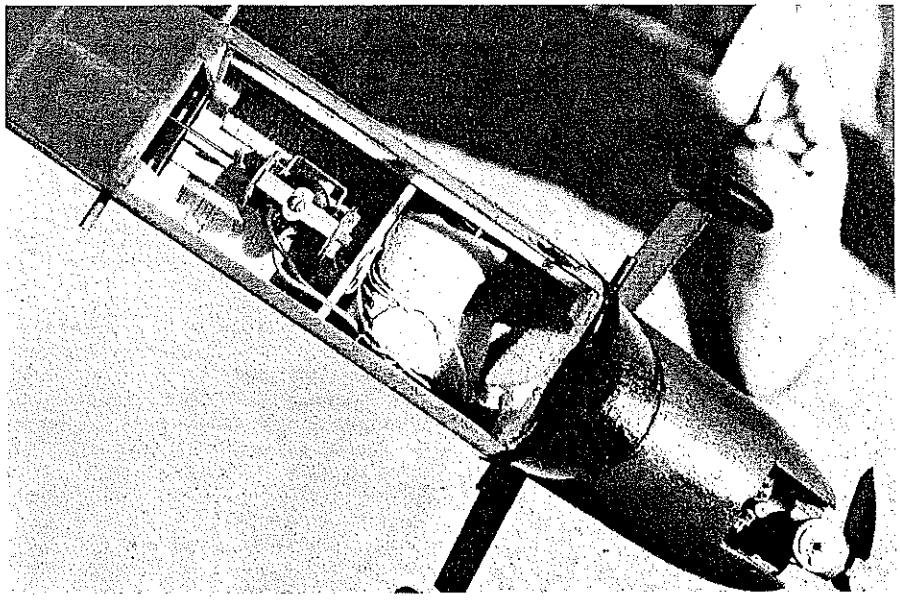
After a final sanding, the tail surfaces can be glued into place. Then the fuselage can be covered with tissue, as discussed later.

Stabilizer. Pin down the leading and trailing edge strips. Roughly shape the tip pieces from ⅛ sheet, and glue them into place.

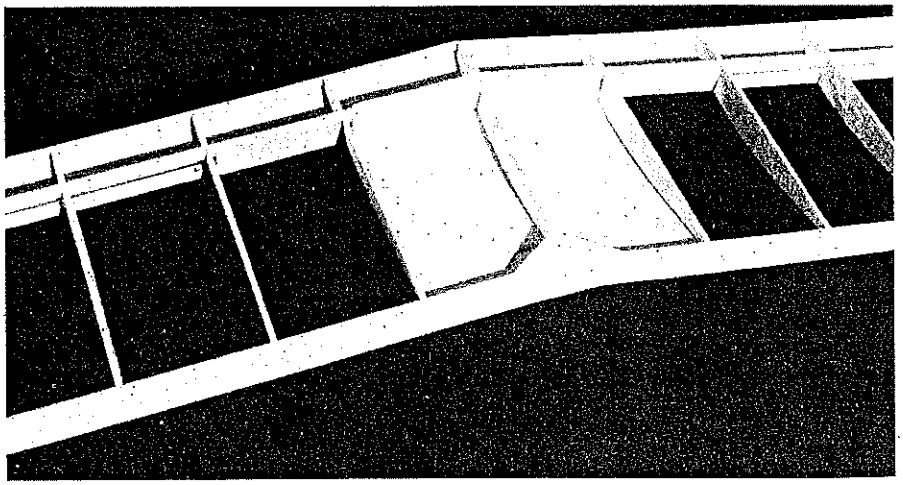
Continued on page 161



Wire loop bolted to the rudder can be raised or lowered to increase or decrease the throw of the rudder by action imparted by the extension of the torque rod, which is soldered when in proper alignment. Very important is to have a low-resistance hinging method; sewing is recommended.



The Ace pulse actuator comes into view when the wing is removed, as well as the foam wrapping for receiver and batteries. There's plenty of room for servicing everything.



Dihedral braces are glued onto both sides of the spars in the center section. Shear webs go on one side of the spars in the adjacent panels. The trailing edge is ⅛ × ½; the leading edge is ⅛ sq.

prop, and bend the shaft over to make a freewheeling catch. There's no need for a winding loop, as these models are more convenient to wind from the rear with a winder. Have someone hold the prop hub and wind in the normal direction.

Make up the landing gear wire now, but don't install it until after covering. The wheels are made from two layers of 1/32 sheet with a piece of 1/16-in. aluminum tubing for a bearing. You could also make the wheels from meat-tray-type foam. Do not even consider using commercial plastic or hardwood wheels, as they will probably weight about as much as the whole model—and will severely limit flying capability.

Use a sanding block to smooth the built-up structures. With clear dope as the adhesive, cover each part with its piece of tissue. The body is covered on its left side (viewed from the rear), while the wing and tail are covered on their upper surfaces. When you have trimmed the tissue carefully, you're finished with covering.

Don't water-spray or dope the tissue. You don't know what warps are until you see what water or regular dope can do to a single-surface-covered model! Actually, you probably could apply a very thin coat of Sig LiteCote or non-tautening dope to add some strength to the tissue. I haven't found that necessary when flying these models in the Arizona desert (which is rough on tissue).

Lay the body down on its left (covered) side, and glue on the motor stick. Fit the wing in place, and glue it. Add the small fill-in pieces, and cover them with green tissue. Sand the mating edges of the tail halves, and join them. When dry, fit and glue the tail into its opening in the body. Make a slot for the landing gear with a razor saw. Glue in the landing gear wire, and hold the wheels on with tiny droplets of glue.

Check the wing and tail for warps. Straighten if necessary, using the heat from an electric stove burner. Use steam only if you don't have a dry heat source; the steam can cause some shrinkage, which may lead to more warps. Make up a rubber motor, and fit it in place. Check the balance; if necessary, add some clay at the front or back of the body. My model required a small bit of clay under the tail.

Flying. Try some test glides, which will be fairly steep due to the high drag of the open structure. Watch for sharp-turning tendencies, which should be corrected by warping the tail. With a V-tail, each half acts like a combination of rudder and elevator. That is, when the right tail is warped downward, it acts like a left rudder plus down elevator. To offset a tight right turn, bend the left tail up slightly, and bend the right tail down a bit less. Some adjustment of the balance might also be helpful.

Try some low-power flights with 50 to 100 turns. If the model stalls, bend in a bit more downthrust. If it won't climb, try some more winds. If that doesn't help, warp both tail halves up slightly until it will climb. This change will affect the glide and require a bit of clay to be added to the front of the body.

My Swee' Pea climbs to the left in about 25-ft.-dia. circles due to a bit of left thrust. When the motor runs out, it turns right in the glide in circles of about the same size.

For longer flights, use a winder. A longer motor can also be used. Maximum turns are determined by the type of rubber you have and whether you use rubber lube—and other variables, such as the age of the motor and the temperature where you fly. Wind up a motor (hook it on a nail) until it bursts, and then use that number of turns, less 10%, as a practical limit.

As for what flight times you should expect, a lightly built Swee' Pea should be easily capable of 40-60 sec flights without thermals. While these No-Cals don't really glide efficiently, they are very light and can pick up thermals easily—so longer flights are possible.

Hope you enjoy Swee' Pea. Why not try to get some friends to build No-Cals and have a contest? Mass launches are fun, with the last one down the winner. Enjoy!

Sportwagon Jr./Headley

Continued from page 89

Place all the ribs, followed by the 1/8 sq. spar. Be sure to leave a 1/8-in. gap between the center ribs, so that (later) the fin can be inserted. When dry, remove from the building board, and sand the tip pieces to final shape. Then sand all over until smooth.

Fin and rudder. These are cut from 1/8 sheet—firm, but not too heavy. Sand all the edges round and the sides smooth, then hinge together. The photos and plan show a sewn hinge; I've found this to be the most effective for a pulsed rudder. The hinge must be almost free of friction, as the pulser isn't very powerful. Be careful with this step, and don't end up with an unbendable hinge!

My method is to drill all the required holes in the fin and rudder with a 1/16-in. drill. Then I sew the rudder to the fin with carpet thread in the pattern shown on the plan. When all is finished, the thread is stabilized with a small drop of glue at each hole.

Assembly. After the stabilizer is covered (but not doped) remove the tissue from the center slot, and glue the fin into place. Make sure that the rudder doesn't bind on the top of the stab. This unit can now be glued to the uncovered fuselage.

Cover the fuselage next.

Finishing. Cover with a lightweight tissue. After water-shrinking, apply a couple of coats of clear dope. A further two coats of color should produce a durable finish. My prototype was painted red all over, with the exception of the rudder. Black trim was applied around the windscreen and along the body. The name and other letters were done with stick-on vinyl.

Radio installation. The front portion of the cabin between F3 and F4 is large enough for the battery and receiver, which should be

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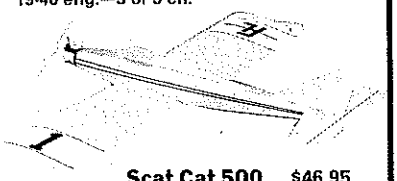

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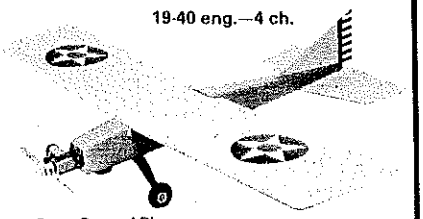

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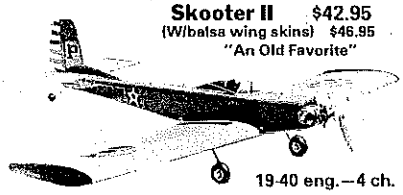

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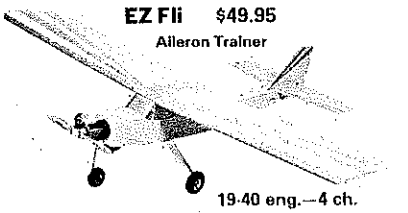

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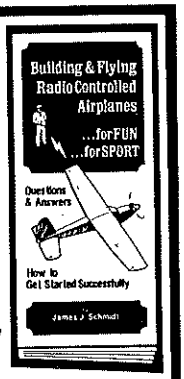

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well-wrapped in foam rubber. The actuator is bolted to the ⅛ ply "bridge" between F4 and F5. A suitable nut should be epoxied under this plywood strip to make it easier to attach and remove the actuator.

The torque rod is bent from 1/16-in. wire. It is attached to the actuator with a scrap of plastic tubing at the front end and held in place at the back with the 1/16 ply bearing. The rudder actuator wire is soldered onto the torque rod on final installation. Be sure that this is correctly aligned.

Keep checking during all these operations to ensure that everything is as free of friction as possible. The final item is the wire loop attached to the rudder. This is held in place with a small bolt. Rudder "throw" is changed by moving this loop up and down.

Flight testing. I treat single-channel RC models essentially as Free Flights. I use the rudder control to occasionally nudge the model back to home base. It is possible to do loops and things with complicated sets of rudder lefts and rights, etc., but I prefer the sport flying aspect of these models—and leave all the acrobatics for models with a few more channels.

The first thing to do is set up the balance with a few test glides. Check that the C.G. is roughly in the position shown on the plans, then try a few hand glides. Make corrections as necessary—a little nose weight for a stalling glide, and vice versa. Shimming the wing is an alternative to using ballast.

When the glide seems about right, try some power flights. Then make the final corrections to the rudder throw and the glide path. After this it should just be fun.

Enjoy!

Editor: We are saddened to report that the author, Jack Headley, succumbed to a heart attack a few weeks before this article was scheduled for printing in this issue. Through the years many of Jack's fine articles and designs have appeared in this and other model magazines. Our sympathy goes to Jack Headley's family and friends on this loss.

Safety/Preston

Continued from page 16

produce to fit the .60-size engine I was using. After one outing at the flying field (which requires mufflers on any engine over .10 cu. in.), I retired the "thingy" because of its inability to attenuate noise. The only useful purpose that this type of muffler seems to serve is to duct the exhaust gook outside the engine cowling on a scale-type model.

Some of you might be familiar with the lawsuit against the Omahawks RC Club in Nebraska, in which a neighbor at their flying site is attempting to collect $50,000 in damages relating to noise complaints. Since this club is not chartered by AMA, should the plaintiff in the suit be successful, it could be very expensive to each and every club member.

Noise is very often the only tangible thing that a flying field neighbor can latch onto when their real complaint could be that they just don't like to see you enjoying yourselves. Paul suggests that AMA should use its influence with the industry to promote effective mufflers. Well, this *could* happen. There is an AMA Noise Committee, chaired by District 1 VP, Ed Izzo, that is examining all the components of a model airplane that produce noise, and they are experimenting with a Pattern-type model to see what can be done to reduce the total sound output. If it were not for the fact that I'm late in writing this column and I haven't yet mowed the lawn, I would be at the Executive Council meeting at AMA HQ today and would probably hear Ed tell the Council about the committee's progress.

In regard to the noise produced by big models, while I've never seen any sound output measurements in print, subjectively the big gas burners are far less obnoxious than the screaming .60s. But the real gems, when it comes to acceptable and pleasant sound, are the new crop of four-stroke model engines. If all we used were four-strokes, I wouldn't mind betting that the majority, if not all, of our noise problems would vanish. Each time I pick up a new issue of a model magazine I see more of these motors being reviewed and advertised. Perhaps sometime in the not-too-distant future, they will be the "state-of-the-art" model aircraft engine.

Another letter that I received in the last month comes from Doug MacBrien of Granby, MA who happens to be a Giant model enthusiast, but the topic of his letter should be of concern to the fliers of all RC models, big or small. On the subject of transmitters with "whistles & bells," over to Doug:

"Radio equipment for our model aircraft has become very reliable and increasingly sophisticated. Reliability is great—more complicated controls can lead to disaster. That's what my letter's about: I bought a new radio last year; one of the new models with dual rates, mixer switches, servo reversing—all the latest.

"Dual rate is great, for Pattern fliers, I guess. For me, it almost destroyed a new model when I tried a split-S. The elevator was in LO rate, and I just missed the ground by about two feet! I've learned something since that incident! I turned the adjustment on the back of the transmitter fully CW, so the LO rate is the same as the HI rate.

"The mixer switch was something else. On my transmitter, it's a three-position toggle switch on the top of the case, easily knocked out of position. I was flying a new Giant Scale model that took hundreds of hours to build. After two good flights, I tried a third. The model taxied OK, but made an undesired 90° right turn after takeoff—it was uncontrollable! I could see it was going to crash, and thought my radio was out. I cut the throttle and watched in despair as the big model went into the trees.

"Sometime later, after I had recovered the pieces, I looked at the transmitter. The mixer switch was in the rudder/elevator Mix posi-