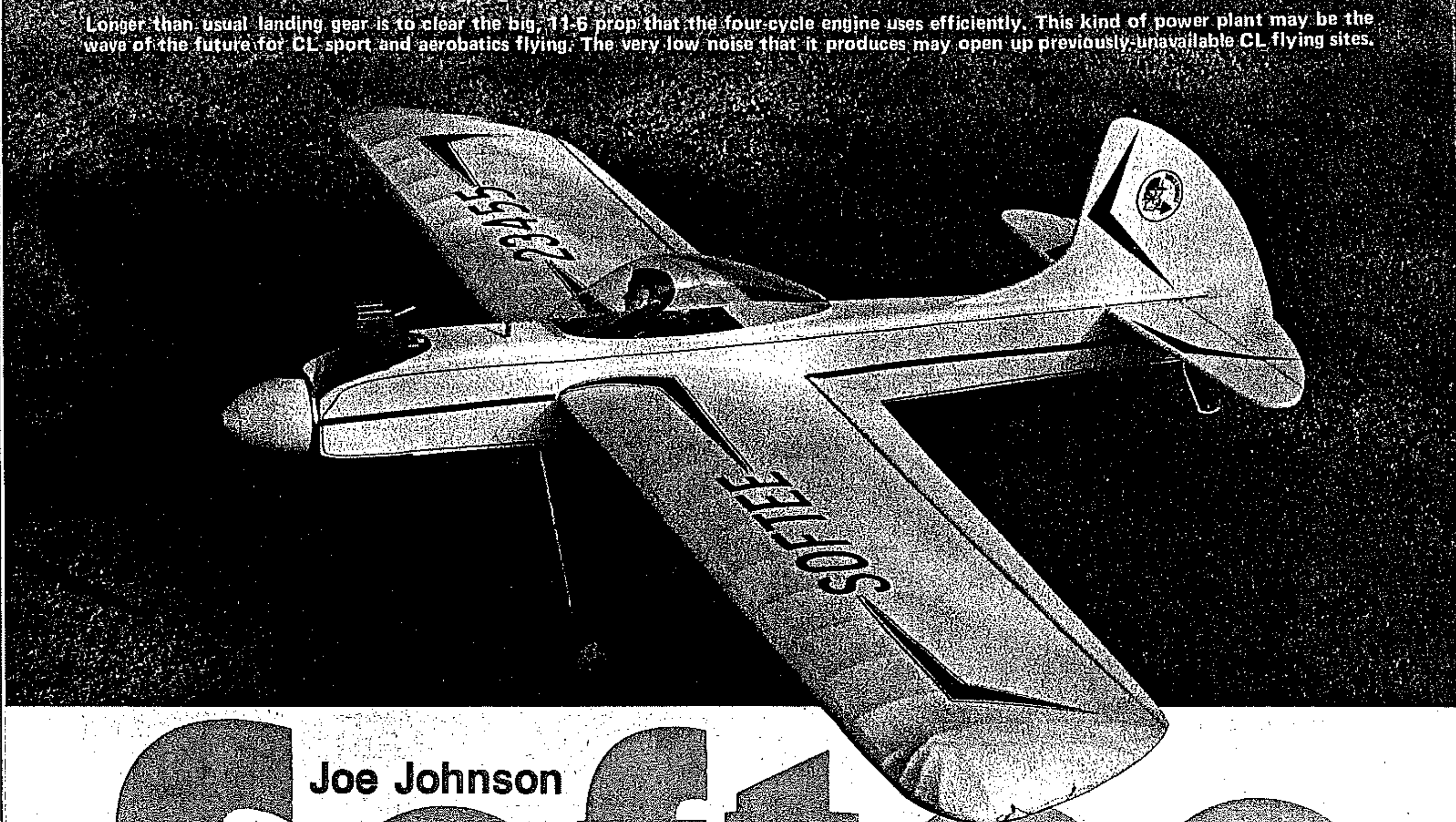


Longer than usual landing gear is to clear the big, 11-6 prop that the four-cycle engine uses efficiently. This kind of power plant may be the wave of the future for CL sport and aerobatics flying. The very low noise that it produces may open up previously-unavailable CL flying sites.

Joe Johnson

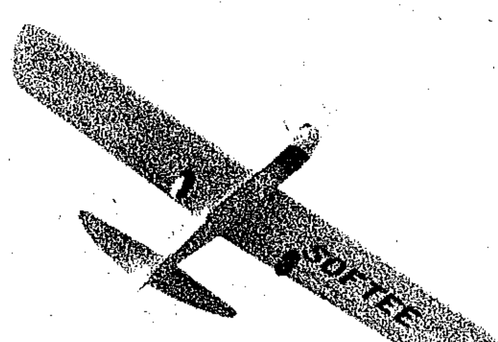
Softee

If you've been in modeling for a number of years, you may remember when there was Control Line sport flying in almost every neighborhood. High-revving engines with the annoying (to non-modelers) sound they make have resulted in severe curtailment of close-in flying sites—to the general harm of the activity. A quiet power source, such as this CL sport model's four-stroke engine, could help turn the tide.

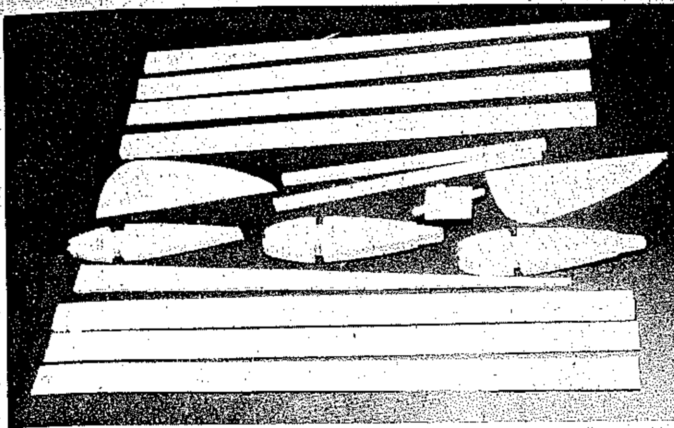
4/9

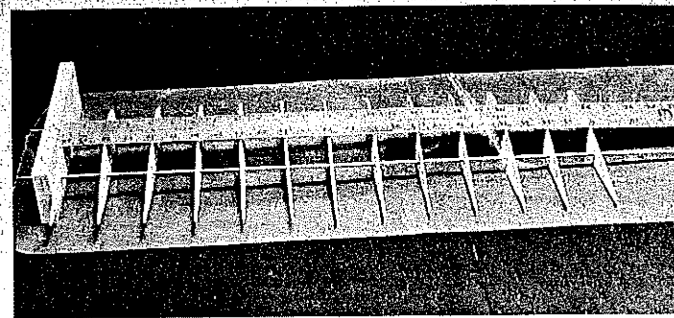
IN THE DECEMBER 1983 issue of *Model Aviation*, Associate Editor Ross McMullen expressed his ideas concerning use of four-stroke engines in Control Line flying. Concerning these remarkable power plants, Ross stated, "To have some chance of continuing to enjoy the pleasures of CL flying, we're going to have to shift to engines which reduce the annoyance factor to our neighbors."

His comments led me to develop this model as a test bed for flying CL models with a four-cycle engine. Strangely, vir-

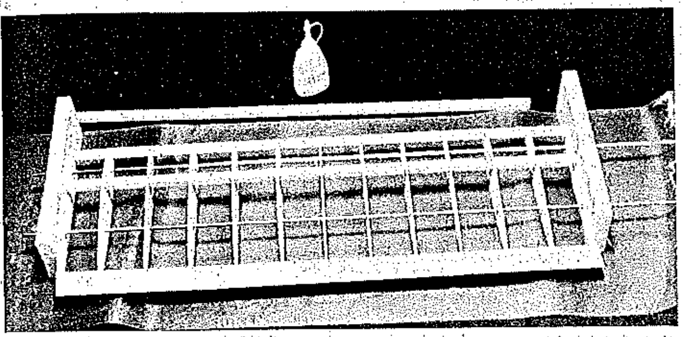


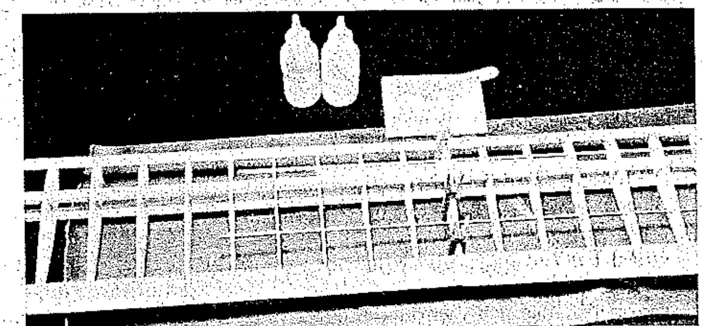
Though not intended as a competition machine, Softee is very maneuverable. The O.S. .40 FS has plenty of power to pull it through verticals. This pic by Vernon Clark.



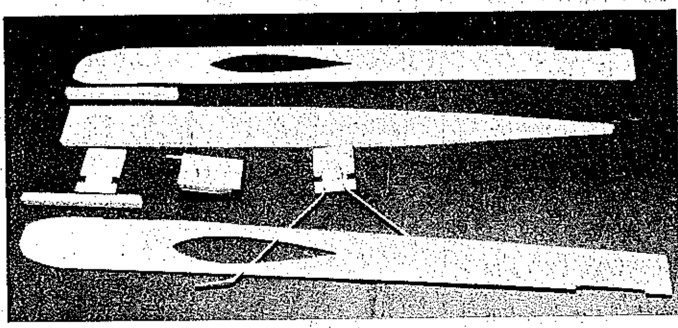


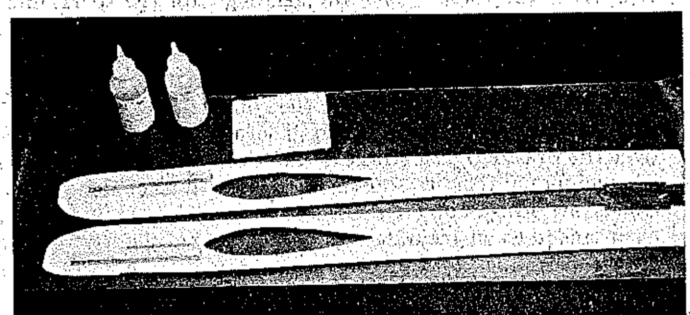
Left: This is the parts "kit" for constructing the wing. Ribs are stack-cut using master patterns made of plywood. Simplicity is indicated by the low count of parts. Above: A rather novel wing jig is used. Ribs are drilled for the wire rods, the end blocks hold the ribs off the work surface, and the ruler is used for precise rib spacing.





Left: The top spar and bottom trailing edge are in place and ready for gluing with CyA. Place the tip blocks level with one another, as this determines how flat the wing will be. Right: The two wing panels are epoxied together with the use of the jig wires for alignment, clothesepin clamps.





Left: Lite Ply fuselage sides, a sheet top "crutch," two plywood bulkheads, and two hardwood engine bearers are the basic fuselage pieces. Note that the landing gear already has been bent and attached to the bulkhead. Right: Engine bearers are epoxied directly to the Lite Ply sides. Doublers at the front aren't needed with this type of construction. Notice the cutouts for the stabilizer at extreme right.

tually no plans or kits are available that are well suited to the combination of weight and power of the four-stroker. Therefore, I decided to design a simple yet attractive model for the O.S. .40 FS.

In that these engines have been considered to produce roughly 60% of the power of a two-cycle of the same displacement, I chose what would ordinarily be a largish .25-sized model. However, the added ounces of engine weight are offset by the smaller fuel tank needed by the four-cycle, so the nose moment length comes out about average.

Although the prototype uses (and the drawing shows) a 2½-oz. Fox tank, this is nearly excessive. A four-stroker will run a very long time on 2½ oz. of fuel. I have also learned that the O.S. .40 FS is more akin to a .30 two-cycle in the power department.

Running a four-cycle isn't difficult, though some things are different from a two-cycle. For instance, staring a four-cycle in the high-speed throttle position is possible, but the four-cycle has a tendency to backfire in this mode, loosening the prop. I rigged a wire with two detent positions to enable starting in low throttle, then advancing to high. Starting is no problem at all with this setup.

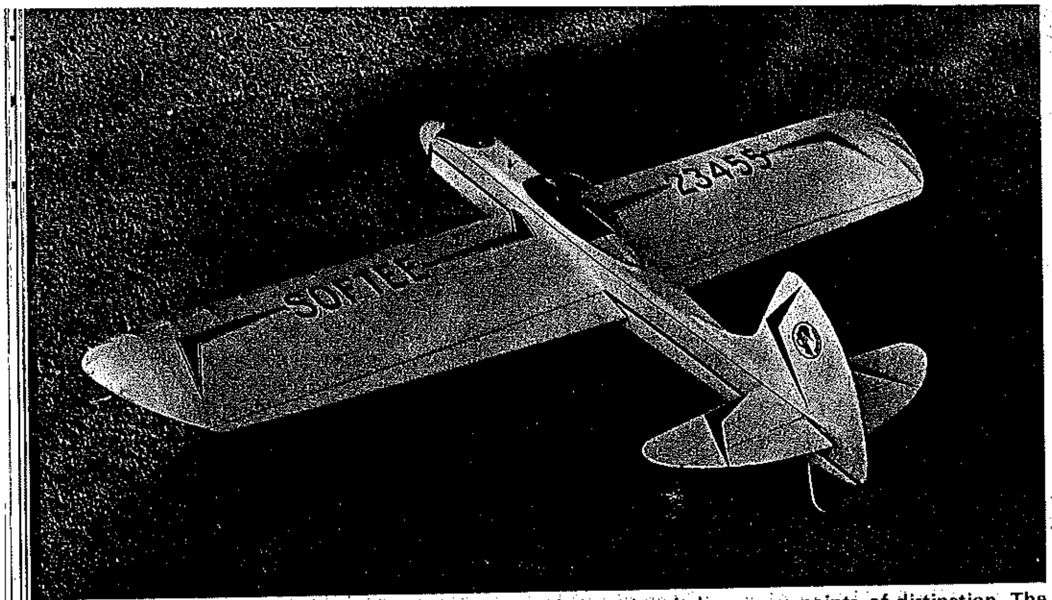
To keep things simple, I use the same 10%-nitro Sig fuel that I use for two-cycle engines. A wide-bladed prop, such as the Rev-Up W or Y&O, seems well-suited to the torque characteristics of the four-cycle.

One last consideration when using a four-cycle engine is to place the fuel tank much higher than usual, owing to the placement of the carburetor well above the midline of the mount. The second generation of four-cycle engines (just now reaching the market) have placed the throat nearer the centerline in recognition of this. With the setup of the Softee, I have found that the engine runs just as well inverted as it does when upright. It runs steady in all positions.

From my experience, the four-cycle engine is well-suited to Control Line flying, and it would be good for others to give it a try. I would guess that a .60 four-cycle would be well matched with many of the currently-available .35-size kits. Just shorten the tank compartment and, perhaps, alter the tank height on designs having a built-up fuselage. A side-mounted profile would only need a relocation of the engine bearers.

For those who find the Softee to be attractive and would like to use it as a first attempt at four-cycle CL flying, I can tell you it is delightful to fly, having above average maneuverability. In addition, the remarkably low sound level of the engine provides a new dimension. In this instance, Softee is a very descriptive name.

Construction. The adhesive to use depends on the builder's choice, of course, but the prototype was constructed almost entirely with thick cyanoacrylate (CyA) glue. The only exception was the use of 5-min. epoxy on the engine mount and bulkheads.



Softee is reminiscent of many sport CL designs, but it has many points of distinction. The prototype was painted with white Sig Skybrite and trimmed just enough for it to look finished.

First, construct a "kit" of the shaped pieces by tracing the plan backed up with carbon paper and the appropriate wood for the part. The wing ribs can all be cut from one pattern, if desired. In that case, use a plywood or metal template as a guide to reduce the center-section ribs, top and bottom, for the sheeting. As a first step, bend the landing gear, and install it to the bulkhead. Also, drill all the required holes.

Wing. The wing can be built in the conventional manner (by shimming it level over the drawing), but consider the wire jig technique that is shown. The rib stacks are rough-cut on a Dremel saw, then sanded to an accurate outline. With a drill press, drill into each stack, using the pattern as a guide. The four holes are a quick way of getting the lead-out holes in the left wing (only two holes will be used in jigging).

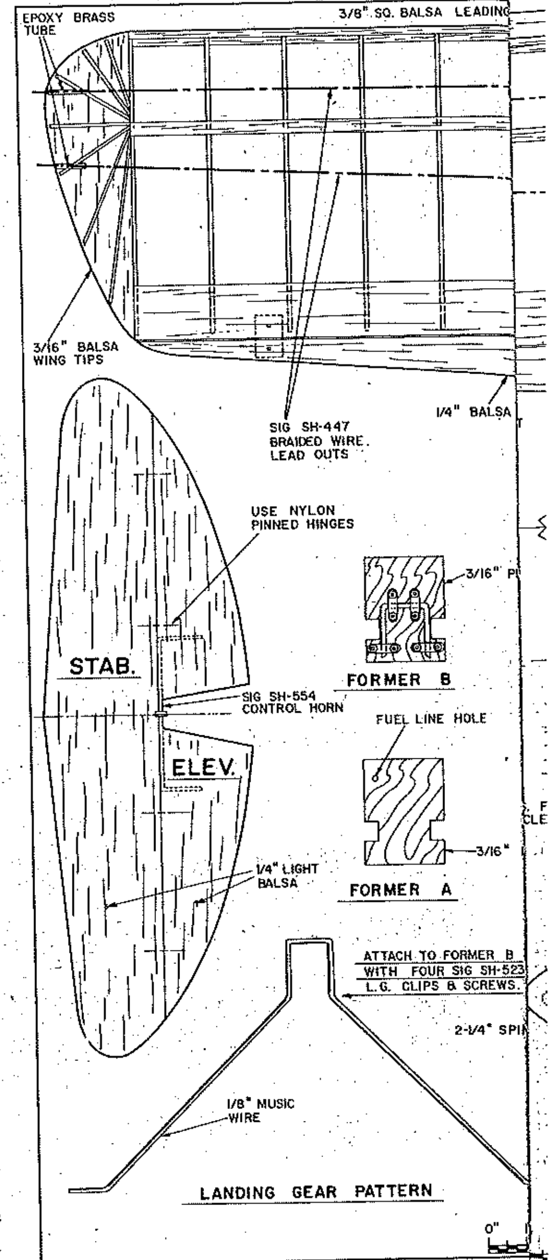
(This jigging technique is not recommended for anyone without a drill press, as the holes must be absolutely parallel. It seems to be very difficult to saw out symmetrical ribs with a jigsaw. As long as the wing is assembled with all the ribs related to each other, everything seems to work out OK.)

Using the rib pattern, drill holes into two sections of 1 x 2-in. (or 1 x 3-in.) pine. Again, mark the tops and fronts. Thread 3/16-in. music wire through the holes, then slide the ribs onto the wire. Be certain that all the ribs are related to each other, using the marks.

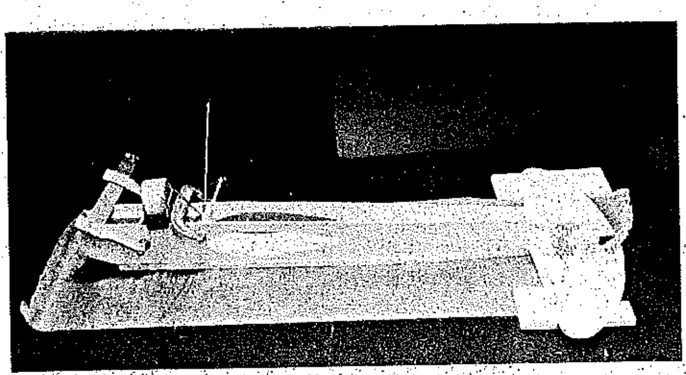
Fit the other pine block onto the opposite end. Then, using a ruler, draw marks on the trailing edge material and on the spars; line up the assembly with the blocks placed on a perfectly flat surface. When everything checks out for squareness in all directions, glue with thick CyA.

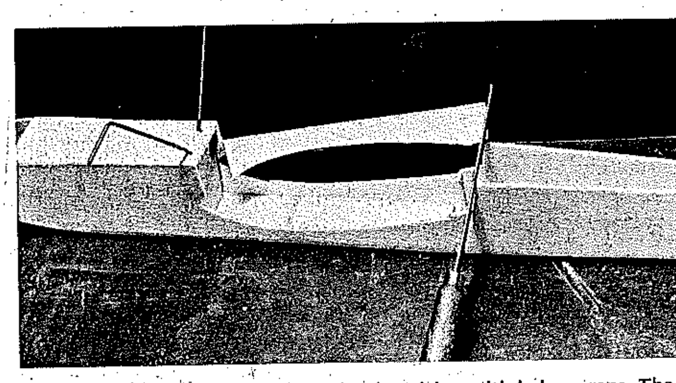
It may be helpful to merely tack-glue the bottom spar, and then finish gluing it after the wing is removed from the jig. The leading edge strip occasionally will be slightly bowed, requiring a pin or two to hold it for assembly. Pull the wire out of the panel. Voila! You have a pretty fair wing panel without too much effort.

Repeat this process for the opposite wing panel, making certain you build a left and a right unit (the right panel is one bay shorter). Remove the pine block from one end of this panel, and slide the wire part way out. With both panels flat, slide the wire back into the center section of the first panel, and align the joint. Use the cut-off ends of the spar material to double the center-section joint.

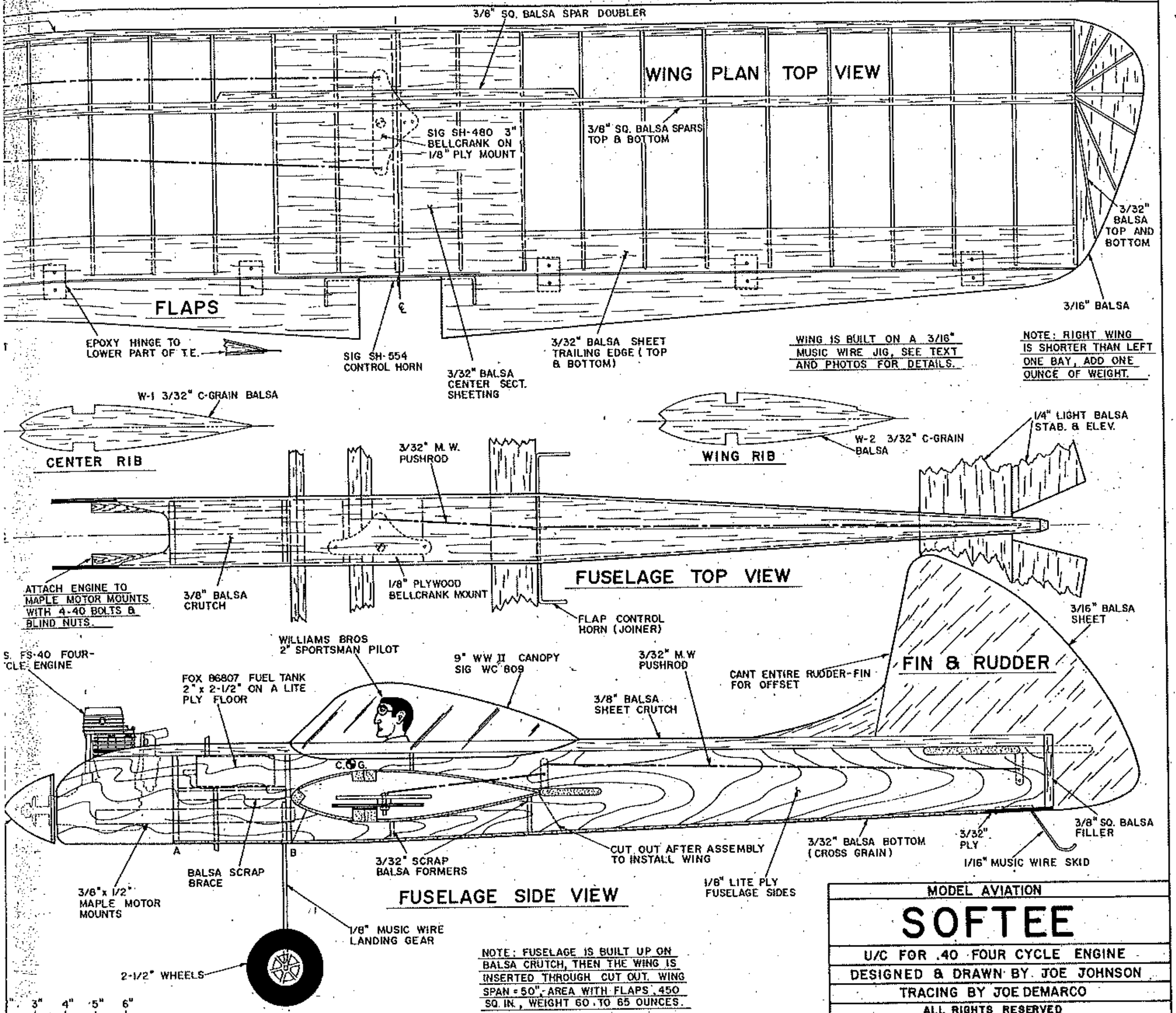


Install the bellcrank on the plywood floor. With a knife, join the holes in the left panel to create slots for the lead-out wires. Go ahead and install the lead-out wires. However, don't add the wing tips until later; they are not needed for the next few steps and may be unnecessarily dinged if installed too soon.





Left: The fuselage top block (on the bottom at this point) is used to jig the assembly. Stab is blocked to a level position with balsa scraps. The stab must be square with the fuselage midline. Right: Cross-grained bottom sheeting was added while the assembly was still on the board. Razor saw is used to cut out the wing slot. The removed piece is reinstalled after the wing has been mounted and the piece is trimmed for a perfect fit.



The bellcrank, pushrod, flap horn, and flaps are installed temporarily at this point. Make certain everything is free of binds before adding the center-section sheeting. (The photos include an error: the horn must be on the top surface to match the elevator setup.) This presents no problem if the pushrod is secured to the bellcrank and flap horn at this point in construction. The elevator pushrod will be secured to the flap horn with a wheel collar during assembly of the fuselage.

Sand the wing smooth, and set it aside while construcing the fuselage.

Fuselage. The top is the crutch, and

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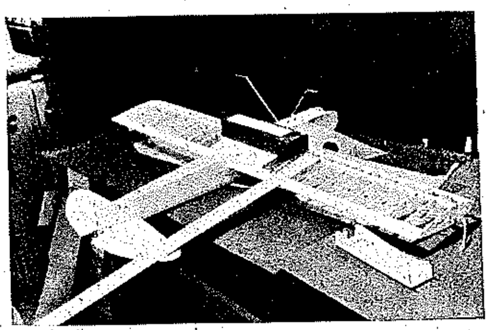

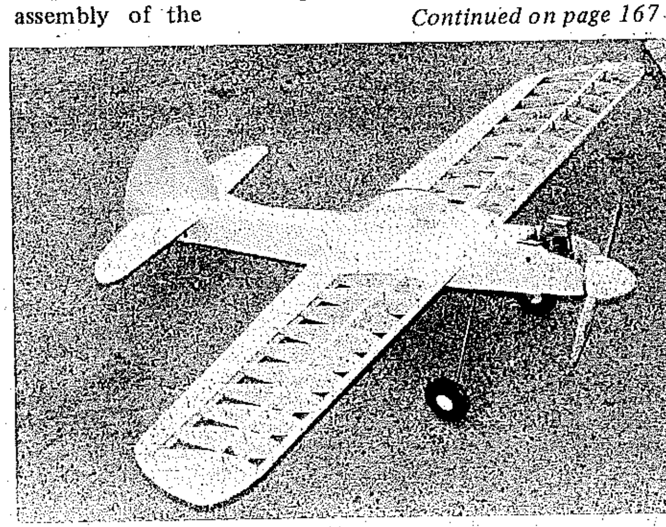

Above: The wing is epoxied in place with the fuselage still on its top. A long ruler is used to place the wing exactly parallel with the stabilizer and square with the fuselage. If you use a burned-out fluorescent ballast for weight as the author did, make sure the label says "Contains no PCBs." Right: A little carving and sanding converts the simple box fuselage into an attractive shape. Canopy and spinner are standard commercial units. The wheels are by Banner.

½A	None
A	None
B	No Juniors
D	No Juniors
½A Profile Proto	Juniors only

Unlimited Class—No Juniors

Event	Restrictions
½A	None
A	None
B	No Seniors
D	No Seniors
Jet	No Seniors

In addition, I think that the 1984-1985 AMA rule book, paragraph 17 of Section 23 (CL Speed) needs to be revised by adding the following sentence just before the last sentence of the paragraph: "In addition, models should maintain a flight altitude which is generally at (or above) the height of the pilot's hand holding the control handle." The last sentence of the paragraph would then be revised to read: "Maintenance of flight outside of these limits, as specified for the various classes, for more than one-half lap shall constitute a foul."

I still think we need a class limited to a specific engine—and maybe a specific plane, as well—for the beginners.

You do a good job with your column. Keep up the good work.

That's all for this month. Comments on Ross' letter should be sent to me.

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

Civy Boy CO-2/Lidberg

Continued from page 84

the copies over the tissue, and then cut out the letters using a metal straightedge to guide a sharp #11 X-Acto blade.

Adhere the letters with thinner applied with a small brush. The original Civy Boy 74 in the *MAN* article featured "Atwood Triumph" lettering on the wing's underside; that's why my model says "Telco CO-2." I don't work for Telco, so this is a free plug, but I do want to encourage use of CO-2 motors.

You don't have to install the dethermalizer (DT), but it would be a shame to lose the model needlessly in a thermal. Install the 1/16 dowel, the fuse snuffer tube, and the wire hooks as shown on the plan. A piece of strong thread or .008 to .012-in. Control Line wire is used as a limit string so the tail will pop up to about 40°. If thread is used, be sure it won't contact the fuse, or the tail will pop off instead of up.

Check over each panel of the wing and tail for warps, and steam them flat if necessary. Assemble the model. It must balance at the wing's TE. For adjustment, move the tank forward or aft. Small bits of clay ballast may also be used. When the tank is located correctly, brace it in place and make the bond paper hatch cover.

Begin test glides with a 1/16 shim under the stab TE. A bit more thickness will probably be needed for a good glide. Move the tail assembly around a bit so there's just a hint of a left glide turn; then add some 1/16 sq. by ⅛-in.-long keys to position the stab on the platform. Make sure the keys are glued to the stab and that the stab is still free to pop up.

Try some low-power flights. The Civy Boy should climb gently to the right even at a low setting. If it won't, there's a warp, or rudder or engine offset that needs to be taken care of. Work up slowly to more power, using the throttle. Most of my CO-2 models fly best when using less than full power.

Hope you enjoy the Civy Boy replica. I believe you'll find it to be a relaxing and rewarding type of modeling.

Screamin' Eaglet/Hunton

Continued from page 91

much more sensitive and responsive as compared to the stock kit Eaglet. You may want to get an experienced pilot to help check out and trim your new model; however, you will quickly become acclimated and appreciative of this higher-performance variation.

Softee/Johnson

Continued from page 95

everything is built onto it for simplicity and accuracy. The 3/8 sheet should be cut roughly to shape, having been traced from the plan with carbon paper.

The stabilizer-elevator assembly needs to be cut out, sanded, and pre-hinged in this technique. If the hinge centerlines are dipped in warmed Vaseline, the adhesives and paint won't stick to them. The assembled unit is carefully placed over the crutch; when properly aligned, it is CyA-glued. Use scraps of 3/8 sheet to make absolutely sure the stab-elevator assembly is level.

Pin the crutch flat over the drawing, using the extension lines to locate the position of the formers. The Lite Ply should have the engine mounts epoxied to them at this time. With 5-min. epoxy, assemble the bulkheads and sides over the crutch. Allow the epoxy to cure, then pull the tail post together and glue with thick CyA.

Cover the bottom of the fuselage with cross-grain 3/32 sheet, except for the area 2 in. or so behind the trailing edge of the wing. With a razor saw, cut a hatch as shown on the plan to allow access to the wing saddle. Remove this section carefully, as it will be reattached later.

Carefully seat the wing into the saddle, checking for accurate alignment by measuring under the tips for being level and from the wing tips to the tail post for being square. When it is seated in perfect alignment, CyA-glue the wing to the saddle.

Install a 4-40 solder clevis on the elevator end of the pushrod. The other end of the pushrod wire goes into the flap horn, secured with a wheel collar. (If the pushrod is made from two pieces of 3/32 wire, held together with a length of 3/32 inside diameter brass tube, adjustments can be made before the brass tube is silver-soldered in place.) Using the horn holes as shown on the drawing will provide 30 deg. of up and down on both the elevator and flaps. *Note: Both the flaps and elevator must be absolutely level when in neutral.*

Return the cutout to the wing top, trimming it as necessary. Complete the fuselage bottom, including the tail skid. Remove from the building board. Sand the flat sides, and round the top moderately.

With a large vertical fin such as this model has, I prefer to cant the entire surface to the right instead of cutting and angling a separate rudder. It's simply that I prefer the appearance of the single-piece fin.

Add the wing tips and lead-out tubing. Sand the whole works smooth preparatory to covering. I covered the wing of the prototype with World Tex. Two coats of Sig Skybrite filler were applied to the wood, sanded, then the entire model was spray-painted with white Skybrite. Accents come from a MonoKote trim sheets and Sig Stripe-Rite tape. Vinyl letters were purchased from an office supply store. The wheels are Banner for 1/8-in. wire axles.

Flying. With 1 oz. of lead weight glued to the right tip and the fin offset shown, the model has excellent line tension without adverse amounts of yaw. The model flies comfortably on .015 in. by 60 ft. lines, and I have flown it on 70-ft. lines. Softee flies much faster than I had anticipated, yet the corners are smooth and well-controlled. This combination seems ideal for flying on a windy day, as it exhibits little tendency to jump and bump.

The long landing gear was necessitated by the need for 11-in. (and even 12-in.) props that are best suited to four-cycle engines. An 11-5 wide-bladed prop works well with this engine-model combination. An added benefit of the rather "stalky" appearance is exceptional smoothness on the ground in both take-offs and landings.

While this model certainly doesn't represent the ultimate in CL designs for the four-stroke engine, it is a splendid sport stunter—which hopefully will generate more interest in the concept.

Just as had been predicted, the noise level is very low and with little of the objectionable "bark" associated with two-cycle model engines. As a matter of fact, I fly in a rather congested residential area, and have been asking the neighbors if the model bothers them. There have been no complaints. As a matter of fact, one gentleman said, "I wish some of the lawn mowers in this neighborhood were as quiet."

It's plain that the four-strokers have

Continued on page 170

the potential to reopen nearby playgrounds and parking lots to Control Line flying.

RC Scale/Wischers

Continued from page 45

formed canopy and cowl, and decals for a Navy-type trainer.

Ace also has another item which is aimed at the Scale modeling group that uses large servos or long wire leads to remotely-located servos. With the large, 150 in.-oz. servos, sometimes the small 26-gauge wire furnished in radio systems isn't adequate to carry the current loads, particularly in the battery pack and switch harness. Ace is now offering larger, 20-gauge, 19-strand wire in three colors and eight-foot lengths, so the RC system can be re-wired as needed. They also offer a heavy-duty switch harness, ready-made, with Noble switch and Deans connectors. The 20-guage wire is available from other sources, but most have fewer strands and are, therefore, subject to vibration breakage unless precautions are taken to prevent the wire from bending near solder joints.

From Bob Violett Models come new carbon fiber shapes to strengthen the weak spots in Scale models without adding unnecessary weight. Magnalite shapes now include strips, sheets, rods, and thin cord for wrapping joints. In addition, there are laminates of carbon fiber and end-grain balsa. Bob also is producing landing gears for ¼-in. and ⅓-in. scale Lasers, made from carbon fiber laminated with a core of fiberglass. These gears have less than half the weight of aluminum and will return to their original shape after stressing from unusual landing loads.

Super-Scale models that are a year or two in building and weekend-special trainers are equally vulnerable to damage or loss due to battery failures. Jomar Products is marketing a Solid State Battery Backer that can be used on any model that will carry the additional load of an extra battery pack. It switches over to the extra pack whenever voltage of the first pack is reduced to below 4.4 volts. A good share of our Scale jobs need the extra nose weight anyway; just substitute batteries for lead weights. Jomar also has an Accessory Controller that provides two actions from a single transmitter control when the lever is moved either side of center. For example, internal and external bomb loads can be dropped separately using the same transmitter control moved to either side of center.

A truly outstanding model in the static display was Merritt Zimmerman's deHavilland 60 Moth biplane with another of his handmade, four-cylinder, 4.5 cu. in., four-stroke 1924 Cirrus engines, this one with ignition. Scale construction was followed as closely as possible. Tons of pressure were used to form the streamlined brace wires, using homemade dies, from Du-Bro pushrod wire. The streamlined steel wing struts were formed to shape from 1018 steel tubing. True-scale pinked tape on the Moth surfaces was produced from a hand-cranked tool that neatly serrated the edges in exact spacing. Tires were made from solid rubber that had been ground to a true clincher shape on a lathe. Wings and tail surfaces were semi-transparent (clear doped over Antique Coverite) to simulate the uncolored fabric of the original. Totally unglamorous at first glance, the model's many unique features gradually unfolded on closer examination. Many viewers passed it by without really seeing a near-perfect Scale rendition of the 60 Moth. In our annual spring search at Toledo for the perfect Scale model, the rewards have been scant.

The World Engines exhibit displayed new engines to delight avid Scale modelers. The OS 1.20 Gemini twin has now