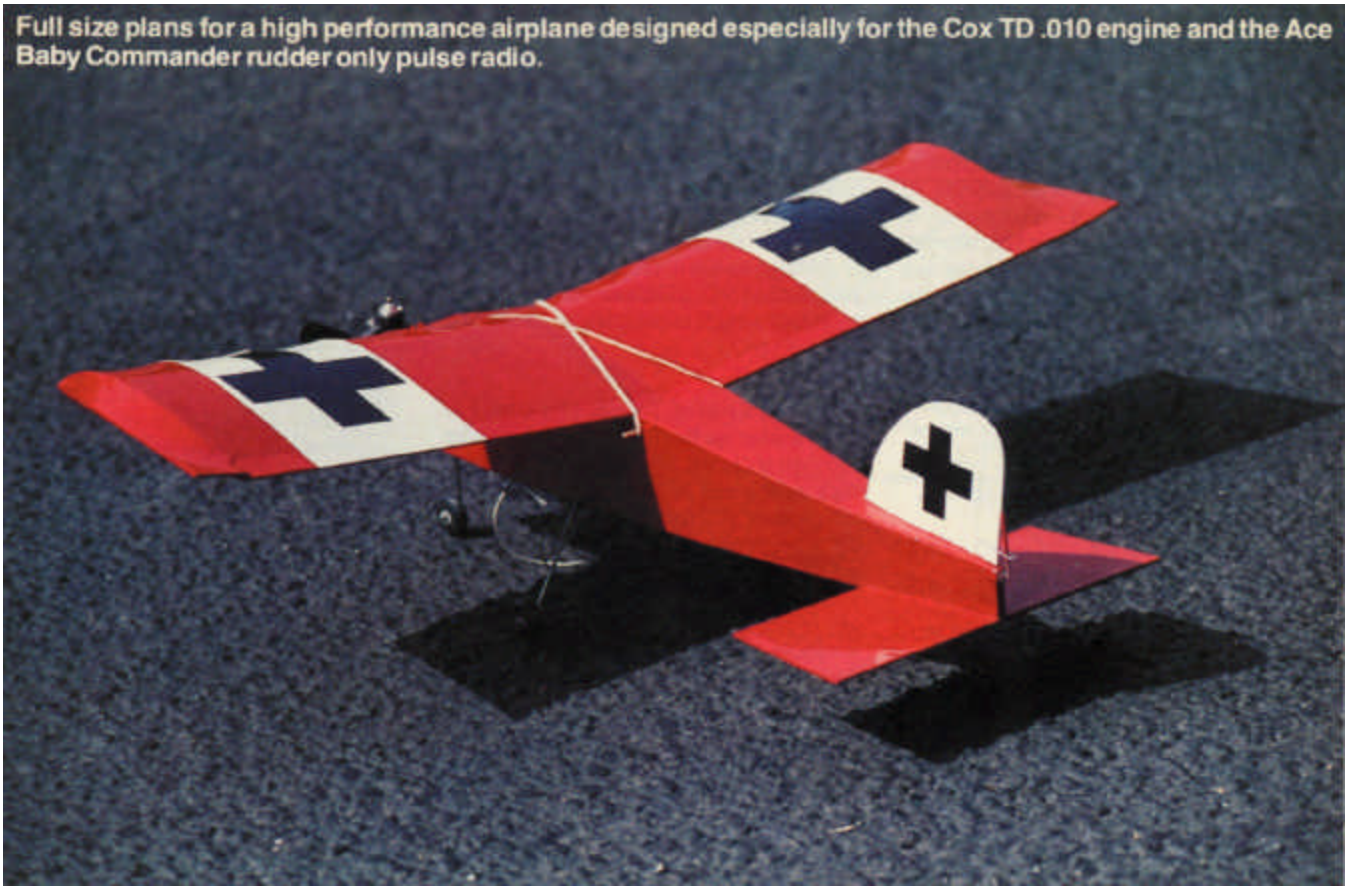
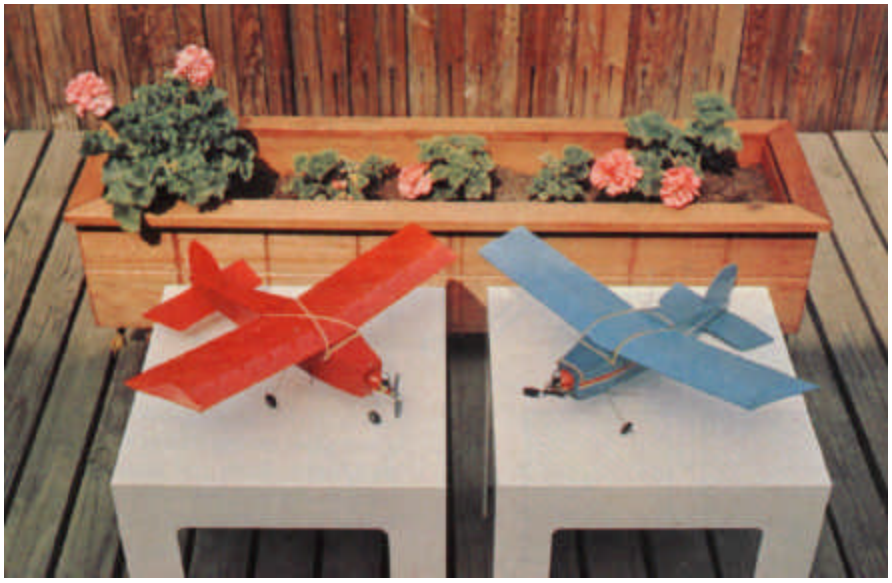


the littlest stick

BY FRED REESE

• Several years ago I first learned to fly R/C with pulse rudder radio and I have continued to design and fly rudder-only airplanes even though my main interests were with full proportional airplanes and equipment. The Ace Commander RO system has brought pulse rudder into a new era of reliability and design possibilities due to its lightweight and small size.

The Littlest Stick was my first attempt at using the tiny Cox .010 TD engine for R/C. This little engine is truly amazing and very reliable provided filtered fuel is used. The inexpensive Cox fuel can cap filter works well.



A little "Ugly Stick" was chosen primarily for ease of construction and fly ability and I have built five of them during the last two years. The last one took only two hours to build, ready for covering and paint. The result is an exciting little airplane that is practical and doesn't require any special equipment. The engine is not restricted and uses the fuel tank mount supplied with the engine. The radio is the Ace Commander DE Superhet receiver with the standard 225ma battery pack and either the Baby or Baby Twin actuator. This airborne package is the one supplied by Ace with their system package. At first I used a 100-ma battery back, the Gem receiver, and the Baby Twin actuator, but I found that neither the lighter system nor the more powerful actuator was necessary. The all-up flying weight is still under six ounces.

The Littlest Stick is not intended to be a beginner's airplane or a trainer because of its responsiveness. It was designed for the ' more experienced flyers seeking more performance than the usual trainers offered for rudder-only equipment. The generous dihedral and large rudder allows the Littlest Stick to do rudder rolls from level flight. The climb rate is fast and a lot of flying can

be done with the standard fuel tank. This is an airplane that can be flown from small flying sites or schoolyards and makes an ideal vacation airplane. No matter how much luggage you take, this little airplane can be squeezed in somewhere. A half-pint of Cox racing fuel will give many hours of flying.

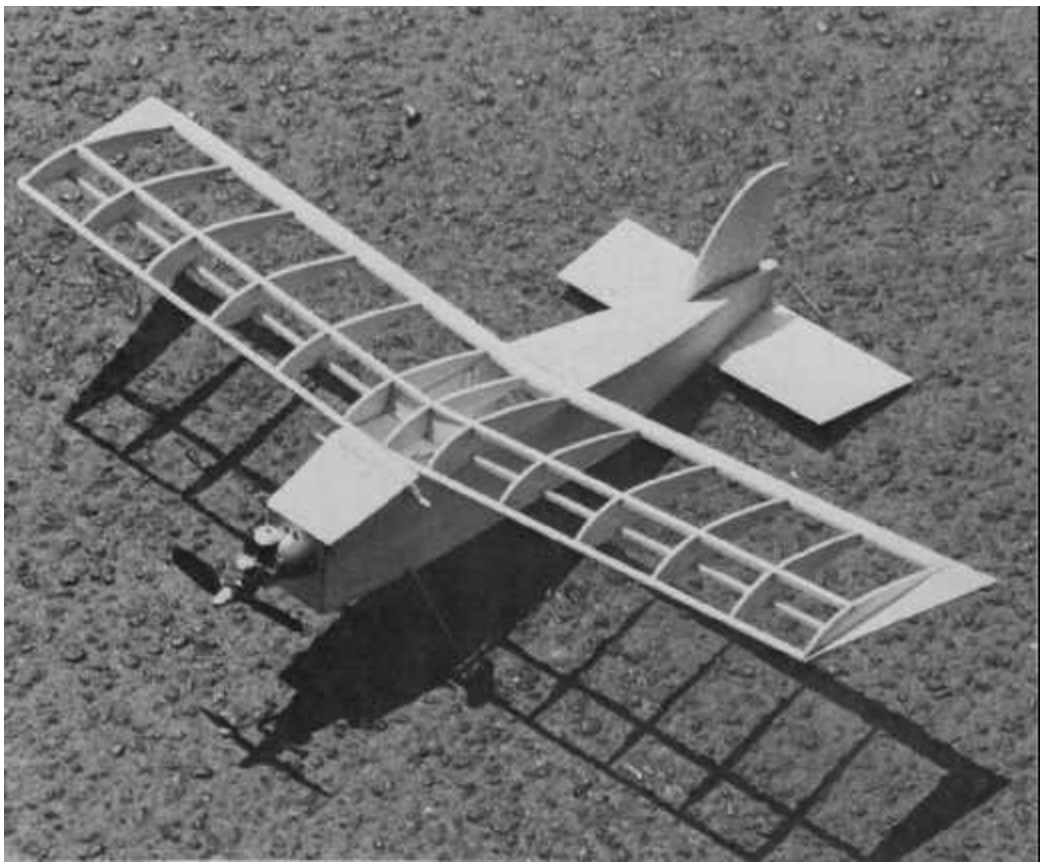
The construction of the Littlest Stick is as simple as I could make it while keeping things light, but strong enough to survive minor mishaps. Construction time is just a few hours, most of which is spent waiting for the glue to dry.

Begin construction by first cutting out all of the parts; then it is just like building a pre-fab kit. Cutting out the parts is actually the hardest part and takes about an hour. Make a cardboard template for the wing ribs and, using a ballpoint pen, trace onto light 1/16" sheet balsa, the thirteen ribs. Put a new blade in your X-Acto knife and cut out the ribs and then pin them all together into a stack and sand with a sanding block until all ribs are the same. Cut the notches for the 1/8" square spars and the leading edge while still in the block form.

I use 5-minute epoxy for all fuselage construction for its speed and strength, but any type of glue will work. Some weight can be saved by using Hot Stuff or Zap. Begin by gluing all of the 1/8" square vertical pieces to the fuselage sides. Please note that the right side firewall brace is 1/16" further aft to provide the required right thrust. Also, the piece at the tail is 1/8" short at the top to allow space for the torque rod bushing. Next, glue the two bulkheads to one of the fuselage sides and when dry, glue on the other fuselage side. Pull the tail together and glue. Bind the 1/16" wire nose gear to the firewall with thread or fine wire and glue and then drill the engine mount holes. Now glue the firewall into the fuselage. Add the 1/16" sheet fuselage bottom and, when dry, trim away any excess wood and add the stabilizer.

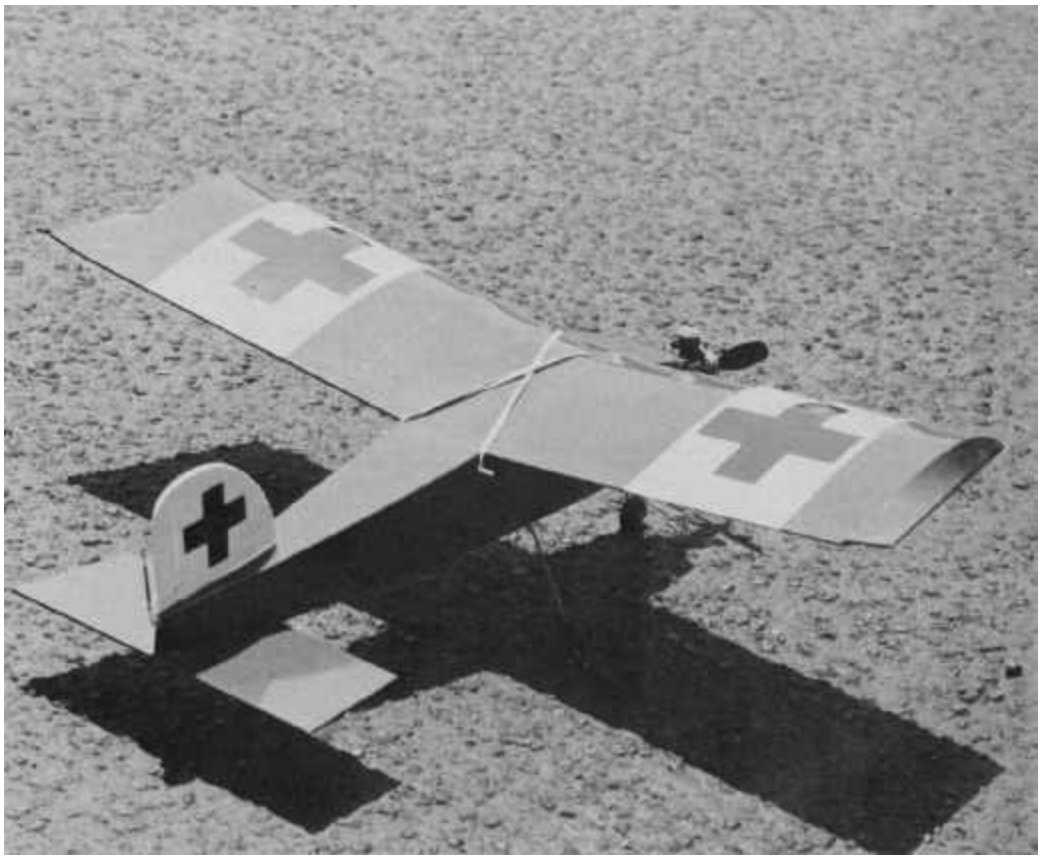
It is easiest to add the torque rod assembly now while the top is completely open. Bend the 1/32" or .030 music wire torque rod and slide on the 1/16" ply front bearing and the plastic tube rear bearing before making the final bend at the tail. Slip the completed torque rod assembly through the hole in bulkhead C and glue the tube bearing in the notch provided at the rear. Do not glue the plywood front bearing to bulkhead C until it can be aligned with the actuator. Now add the top rear 1/16" balsa sheeting and, when dry, trim and add the rudder.

Cut a piece of 1/16" balsa for the front hatch with the grain running crosswise. Cut off the front 1/4" of the hatch and permanently glue this 1/4" x 1/16" piece to the firewall and fuselage sides. To stiffen the remainder of the hatch and provide a tab to hold the front down, glue a piece of scrap 1/16" x 1/2" that is a little bit longer than the hatch down the center of the underside of the hatch. Trim any excess from the rear of the hatch but leave about 1/8" sticking out in the front for the hold down tab. A

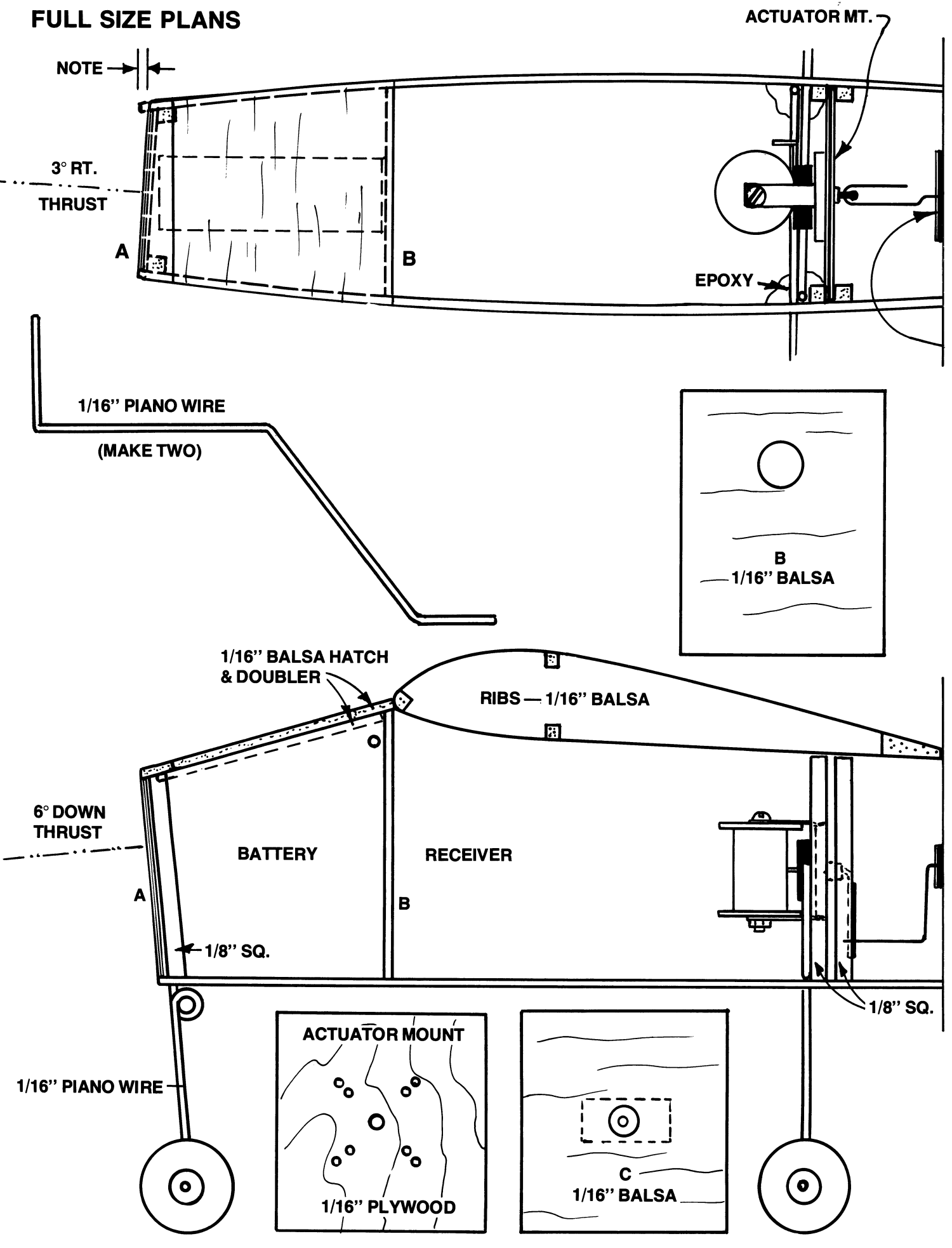


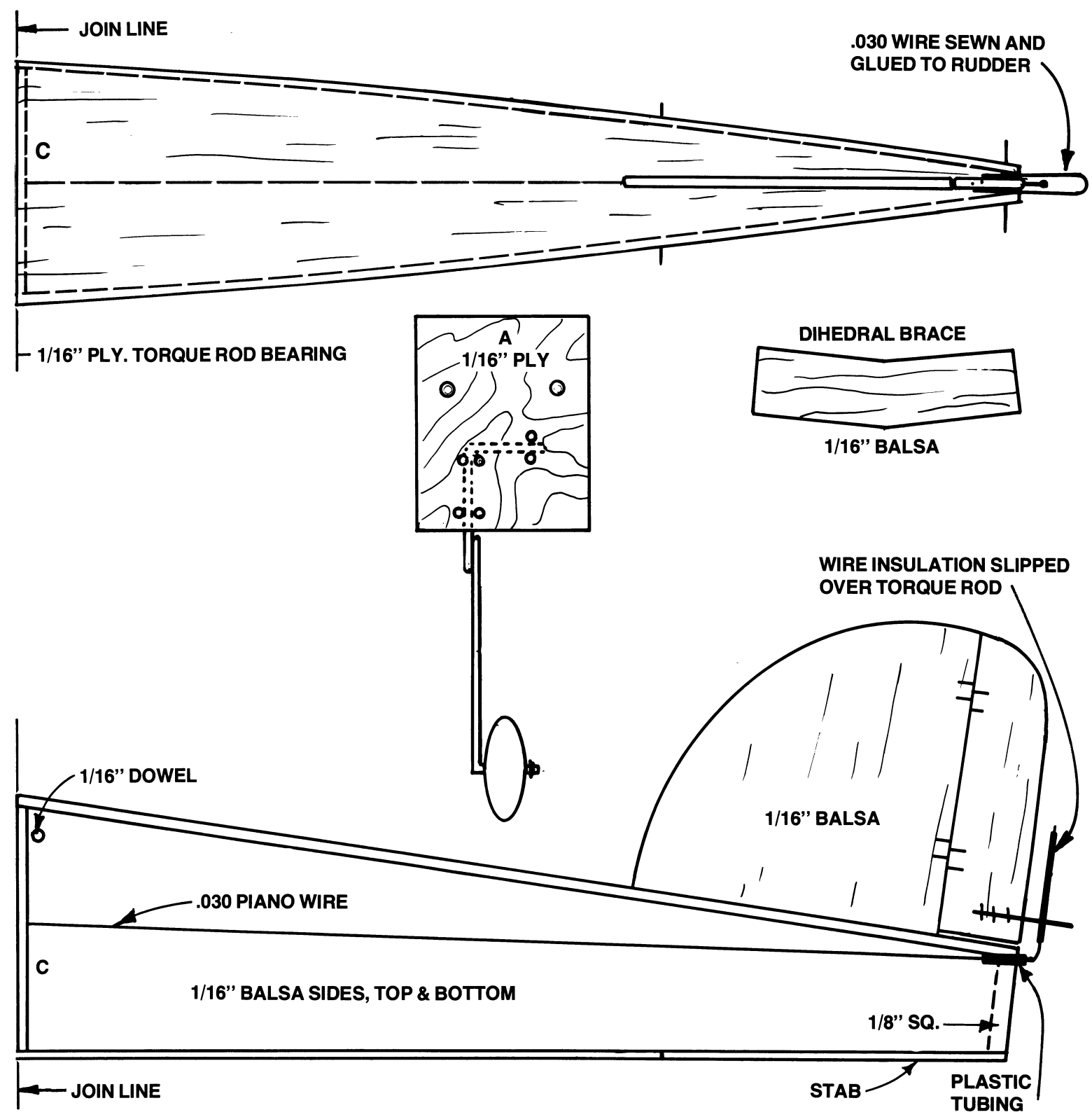
Using Zap or Hot Stuff, you can build the entire Littlest Stick in one evening. Screw the engine in place and install the Ace System - another hour, if you're slow!

Then cover it with Solarfilm and trim it as you desire - one evening more at the very most — and you're ready to stick it in your pocket and go flying!



FULL SIZE PLANS





'THE LITTLEST STICK'

ENGINE — COX .010 TD
RADIO — ACE BABY OR BABY TWIN
SPAN — 19¾ INCHES
LENGTH — 14¼ INCHES
WING AREA — 85 SQ. INCHES
WEIGHT — 5½ OUNCES

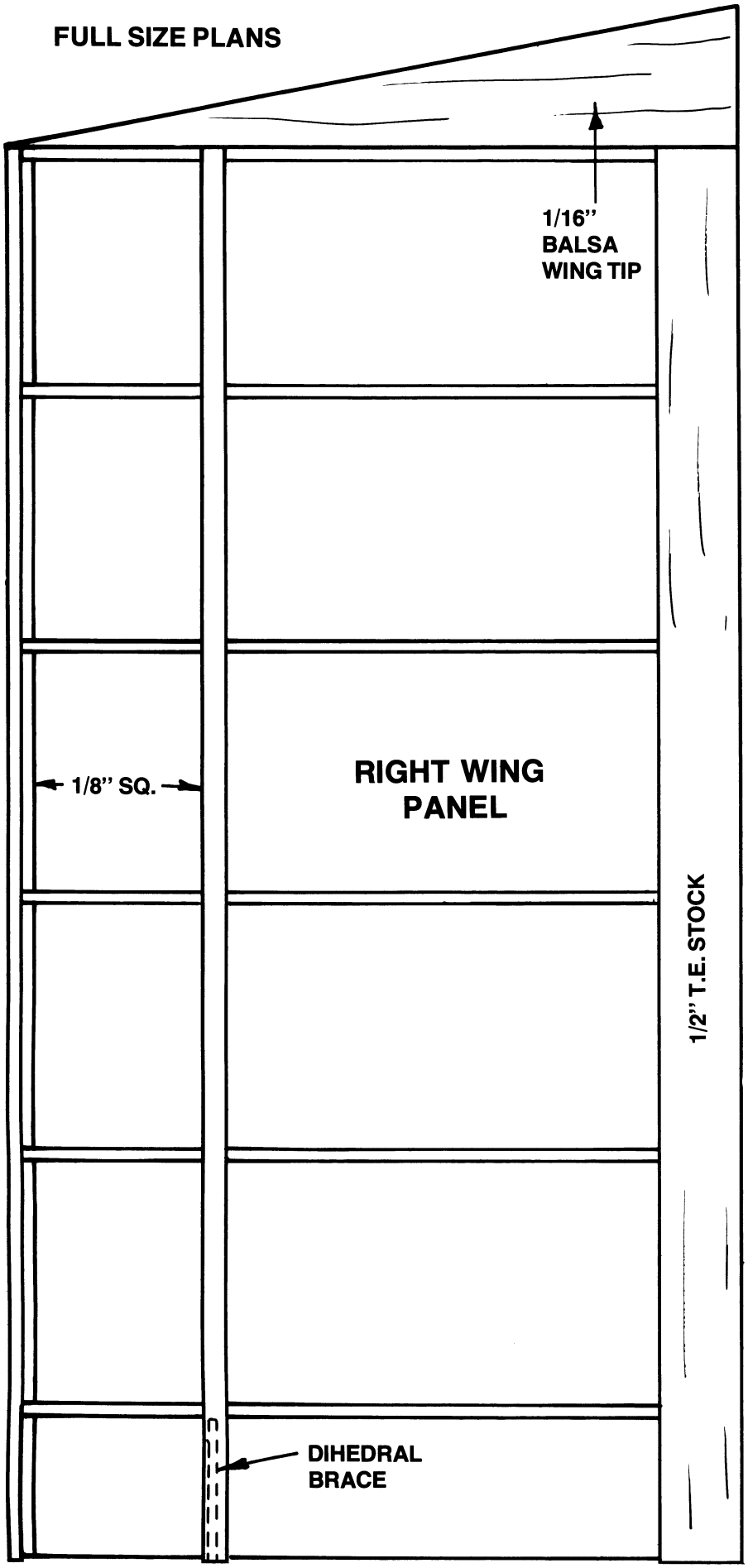
DESIGNED & DRAWN BY FRED REESE

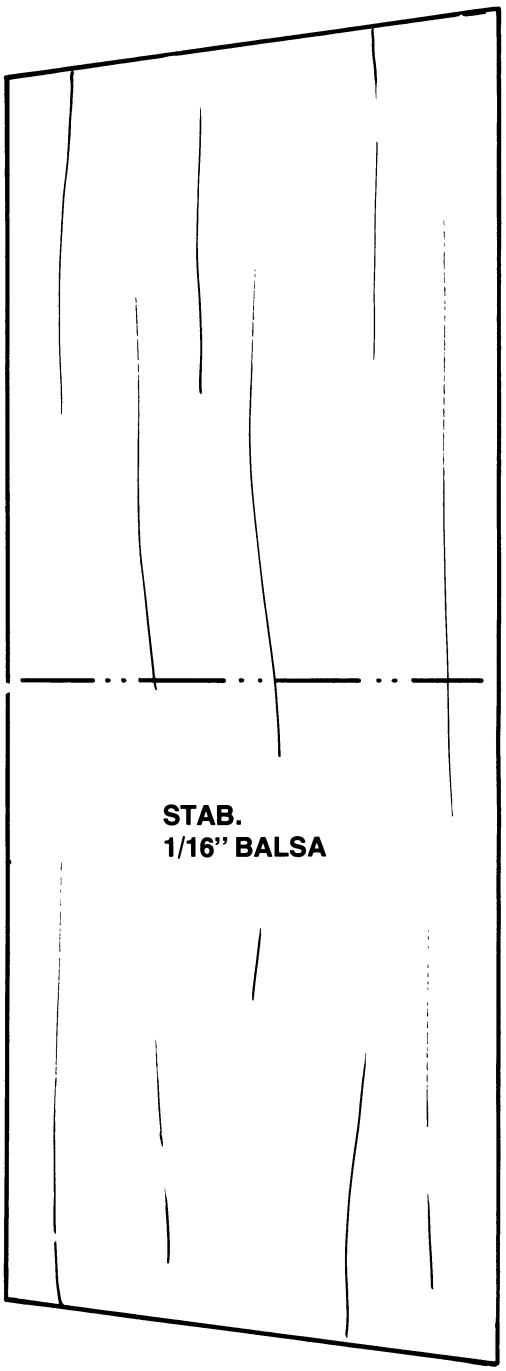
FULL SIZE PLANS

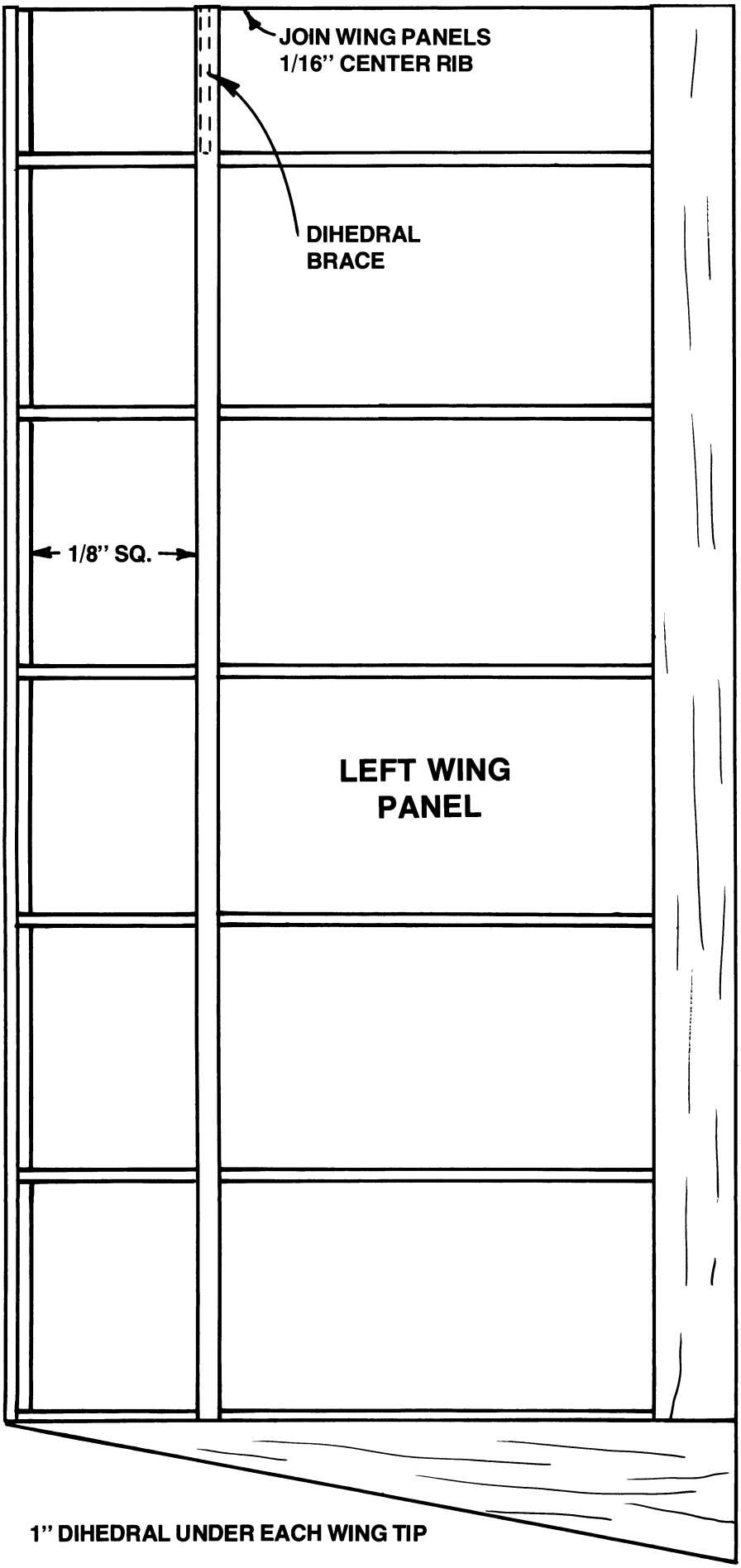
rubber band will hold down the rear of the hatch when the airplane is finished.

Bend the two pieces of 1/16'' music wire for the rear landing gear and drill small holes in each side of the fuselage just ahead of the front 1/8'' square actuator mount. Slide one wire through each side and epoxy them into place. This cross torsion landing gear has proven adequate in every way and allows the top of the fuselage to be open so that the actuator, on its plywood mount, can slide in and out when needed without being glued in permanently. In my later Littlest Sticks, I omitted the wing hold-down dowel reinforcements and, instead, smeared some glue over these areas on the inside.

The wing is built in one piece and then cut in the center. Put down Saran Wrap over the plans on a flat board and pin down the







trailing edge and the lower 1/8" square balsa spar. Glue down all of the ribs except the center one and add the top spar and leading edge. Add the wing tips and allow to dry. When dry, cut the wing in the center and carefully fit the halves together for the proper dihedral and glue together. I did not bother with the dihedral brace on my latest Stick and the wing still outlived the fuselage so I feel that it is really optional. If you want to add it, do it now and then fit the center rib into place. Except for sanding, and the Solarfilm or Super MonoKote, the wing is finished. When covering be careful not to twist the wing as, at this point, it is flexible. If you do end up with a twisted wing, keep working it with an iron until both panels are straight.

Paint the fuselage and tail with a minimum number of coats of dope. The secret here to a nice finish is #320 wet or dry sandpaper used dry. Brush on two coats of a thin dope-talc mixture, sanding with the #320 paper between each coat and follow with one or two coats of color. Trim with MonoKote trim, DJ's Trim Sheets, contact paper, or plastic tape and you are finished. The balsa grain is still visible but the finish is smooth, shiny and fuel-proof. Actually Super MonoKote or Solarfilm could be used all over. Hinge the rudder with a double strand of regular sewing thread using a "figure eight" stitch. Seal the thread with a little glue or clear dope, being careful not to get any between the fin and rudder which would bind up the linkage.

The Adams Baby actuator should be mounted by sewing with carpet thread to the 1/16" plywood actuator mount. Use only a small soldering iron to attach the wires to the actuator. Do not use a fast heating soldering gun on or near the actuator magnets. The magnetic force field of the gun will reduce the strength of the magnets in the actuator. If you must use a soldering gun, remove the coil from the actuator by removing the center bolt. The radio may be switched to other airplanes in this manner by having several actuator front assemblies which are available separately from Ace. Also, the direction of the actuator may be reversed without changing the wires by rotating the coil so that the wire lugs are on the bottom instead of the top, or vice-versa. The battery pack and the receiver are wrapped in foam and just stuffed into the remaining space using pieces of foam to position to adjust the CG.

Before flying, check the CG, it should balance on the spar. Flying trim can be changed by slightly shifting the receiver and battery pack forward or aft to get the desired rate of climb. The Littlest Stick should fly in a steady but level climb. If it tends to zoom or "roller coaster," shift the radio forward or add weight to the nose. And, naturally, if it doesn't climb enough, shift things aft slightly. The glide after the engine quits will be fairly fast but control response remains very good. Wind does not bother the Littlest Stick too much and it can be flown under normal flying conditions. For longevity fly over grass rather than pavement. □