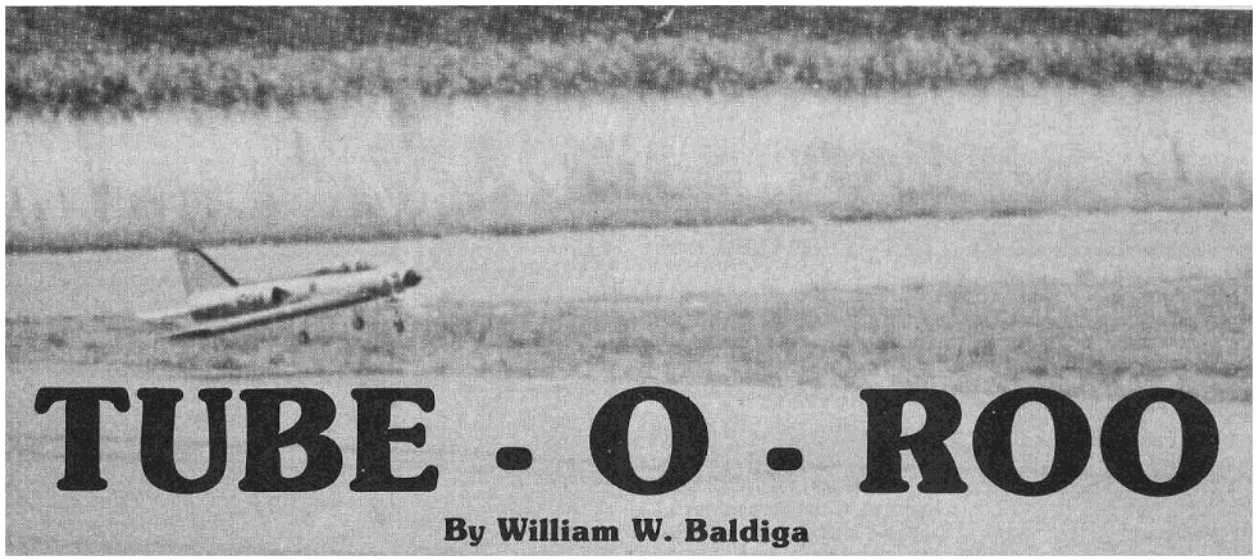


TUBE - O - ROO

By William W. Baldiga

Maybe --- just maybe --- if you have the spirit of adventure and the desire for something different, the Tube-O-Roo will fly. It takes a Sullivan foam wing, a mailing tube, and a sense of humor to construct. Top it off with a .45 to .60 engine, and . . .

I think it will **fly!!** If you share a spirit of adventure, a desire for something different and a sense of humor when you first think about it, find a mailing tube, a Sullivan wing and let's share a unique modeling experience together --- the Tube-O-Roo.

I have toyed with the idea for some time of a highly swept wing airplane, and the Tube-O-Roo was built for experimentation on this type of model --- and just for the fun of it.

Herein are the detailed instructions and plans, along with helpful suggestions to assist in eliminating potential problem areas. The narrative will follow the actual construction sequence, which begins with the wing.

CONSTRUCTION

Wing:

A Sullivan wing is a nice complement to the Tube-O-Roo fuselage. This wing is strong, but light, and very easy to work with as far as installing aileron guides, sheeting, etc.

TUBE-O-ROO
Designed By : Bill Baldiga

TYPE AIRCRAFT
Sport & Pattern
WINGSPAN
48 Inches
WING CHORD
12½" at Root
TOTAL WING AREA
610 Square Inches
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Swept 30°
DIHEDRAL, EACH TIP
None
OVERALL FUSELAGE LENGTH
46 Inches
RADIO COMPARTMENT AREA
(L) 11⅛" x (W) 3½" x (H) 2⅝"
STABILIZER SPAN
24 Inches
STABILIZER CHORD (incl. elev.)
7" (Avg.)
STABILIZER AREA
168 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
6¼ Inches
VERTICAL FIN WIDTH (incl. rudder)
7½" (Avg.)
REC. ENGINE SIZE
.45-.60 Cubic Inch
FUEL TANK SIZE
12 Ounce
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Cardboard mail tube & ply
Wing ..... Foam & Balsa (Sullivan Wing Kit)
Empennage ..... Balsa
Wt. Ready-To-Fly ..... 104 Ounces
Wing Loading ..... 24.5 Oz/Sq. Ft.

Begin by cutting a 30° sweep into each wing half. To cut the 30° sweep, lay a 30°-60° triangle against the leading edge of the wing. Push both up against a wall or anything flat and mark a line in the center section where a cut will be made. I jigged my wing halves up on a table saw and simply pushed them through at the proper angle. If a saw of this type is not available, follow the center section mark carefully with a saw, knife or hot wire.

Since the wing spar slots now have an angle of 30° on both wing halves meeting in the center, I used a piece of 1/8" aluminum bent to fit the angle. Glue it in later when ready to join wing halves.

To install NyRod or other aileron guides, temporarily tape wing halves together. Plan to lay the aileron servo on its side as far forward as the spar will allow; next marking where the arm of the servo and control wires will meet. (I have my servo buried low in the wing with control wire connected to the top of the servo arm.)

To have a smooth, no-bind aileron movement, it is essential that the wire and guides be run straight out from the servo before bending back to the trailing edges, as shown on the plans. To install aileron cable guide tubing, simply mark the top of any intersecting foam ribs and spar with a pen, notch the foam and insert tubing. After proper alignment and fitting, it can then be glued in place.

Next, turn your attention to the landing gear hardwood blocks. I installed these at an odd angle to take advantage of gluing it next to the molded rib that is now at a 30° angle. When the landing gear blocks are first laid in place and resting beside the rib to which it will be glued, you will notice that the back side will be high so mark with a pen the shape dictated by the rib and sand to shape. The slots in the landing gear blocks to hold the landing gear wires are the same

as all others, except that they are at a different angle. You will find that bending the main gear wires takes a little more planning, but it is not difficult.

After the landing gear blocks and aileron cable guides are installed, you are ready for wing sheeting. You can sheet the wing halves according to the plans, or in any fashion you like best.

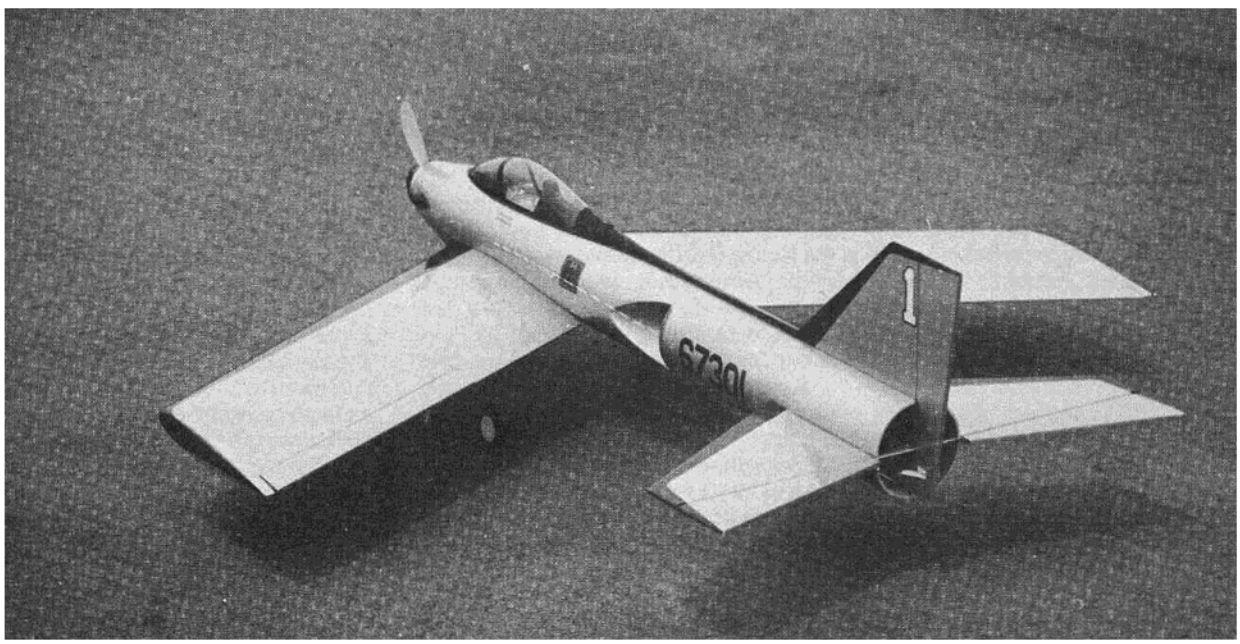
On the plans you will notice an air space between the trailing edge of the foam wing and where the top and bottom trailing edge sheets meet. I thought it would be tricky to fill in the void with expandable foam, but it caused minor problems, and I hesitate to recommend this. Instead, glue a trailing edge balsa filler to the back of the foam trailing edge and sheet over it.

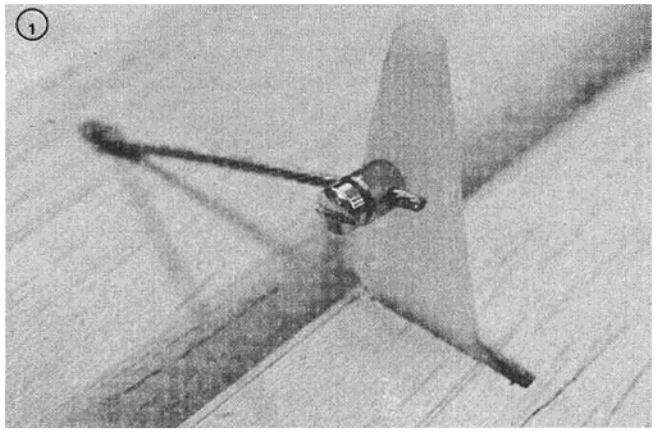
Before the wing halves are glued together, tape them together again and cut off the front part as shown on the plans to eliminate the point. Next, cut out a notched section at the trailing edge.

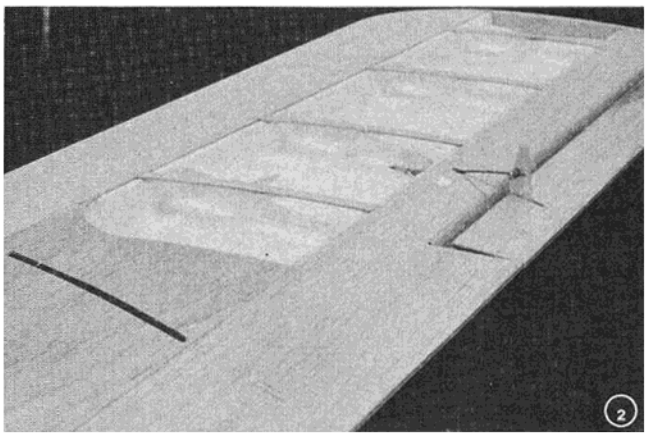
After taking the wing halves apart, lay one on each side of the fuselage and mark the airfoil contour that will have to be cut in the fuselage later. Since the contour marks represent the center section of the wing, the leading edge will drop down a little steeper then indicated because of the width of the fuselage and

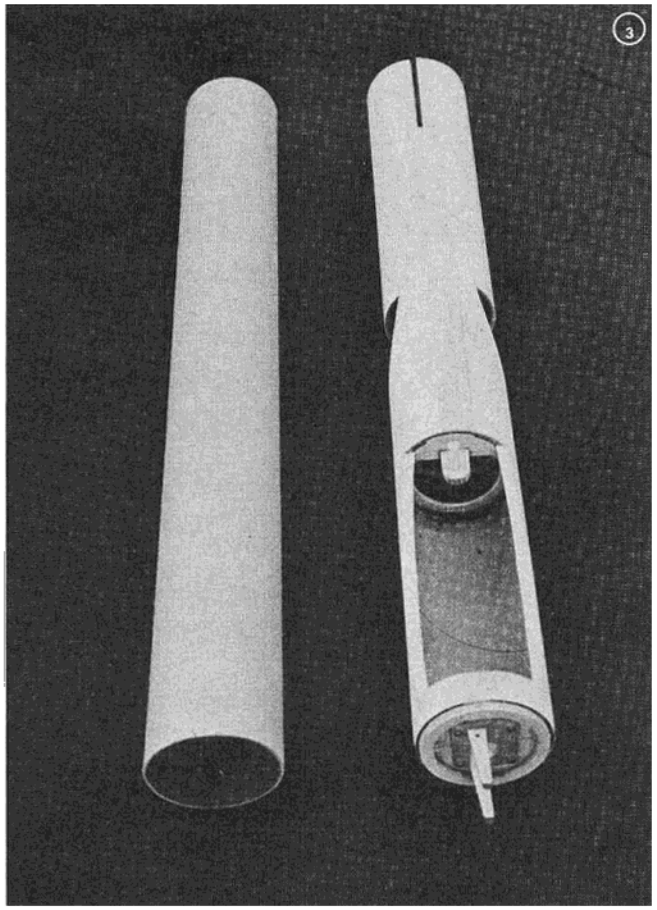
ABOUT THE AUTHOR

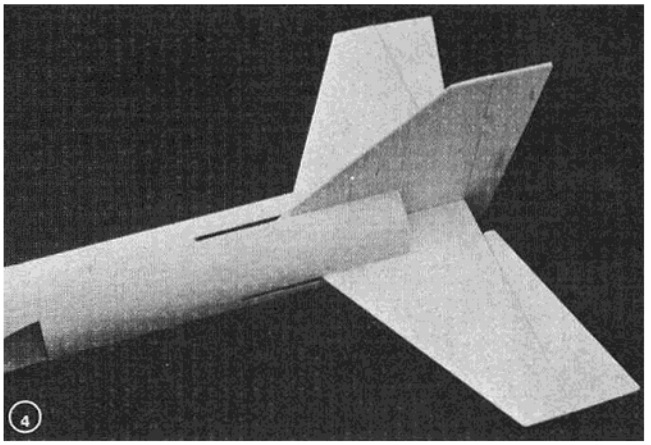
William W. Baldiga was born in Dayton, Ohio and currently resides with his wife in Alexandria, Virginia. He is a Production Artist for an exhibit firm (graphic art, models, technamation, silk screening, drafting, etc.). Bill became interested in model planes at the age of 8, starting out with solid balsa airplanes and progressing to a control line A.J. Fireball in 1941. Due to numerous moves during WW II due to his father's occupation as an aircraft engineer, his interest waned. He pursued his interest in real aircraft, and obtained a private pilots license in 1952. Bill's interest was renewed in 1967, when he attended an R/C contest at Andrews Air Force Base. He started building in that year and has been enjoying the hobby for the last 10 years.











(#1) Cut slots in bottom of ailerons, cut bottom off aileron horn and glue in place. (#2) Main landing gear slots run at an angle perpendicular to wing rather than parallel because of rib mouldings being at a 30° angle. (#3) Glimpse of wing hold down rings. Glue in place along with hard wood hold down before firewall is glued in place. You will get a good fit because of being able to look inside fuselage. (#4) Slide stab, then fin in place like a 15¢ glider model. Determine where you want control horns placed before anything is glued in place. Elevator horn is made from brass tube flattened in vise and then drilled.

the wing sweep, so take a carpenter's contour gauge, if handy, and move out on each wing half the distance each side of the fuselage would take and re-mark the slight change in contour.

After cutting out the ailerons to the dimensions shown on the plans and temporarily hinging and installing the aileron horns, the wing can be glued together.

I had a small opening in the leading edge where the hold-down dowels were to be glued in place, due to the hollow moldings made into the wing kit itself, and due to its being cut at an angle. Fill the void with expandable foam or other material, and the dowels will hold nicely. Seal the leading and trailing edge center sections with a thin piece of 1/8" plywood.

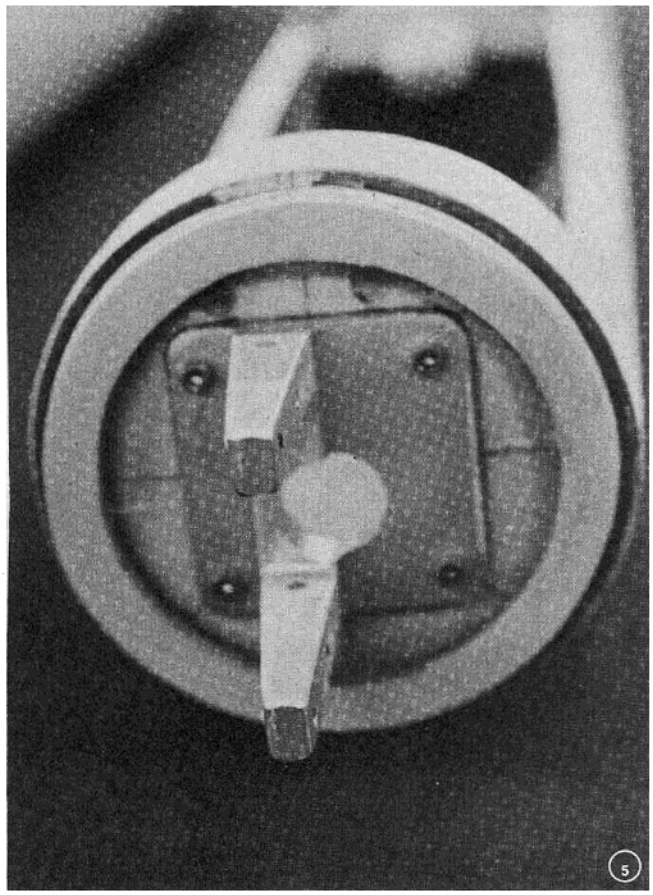
Fuselage:

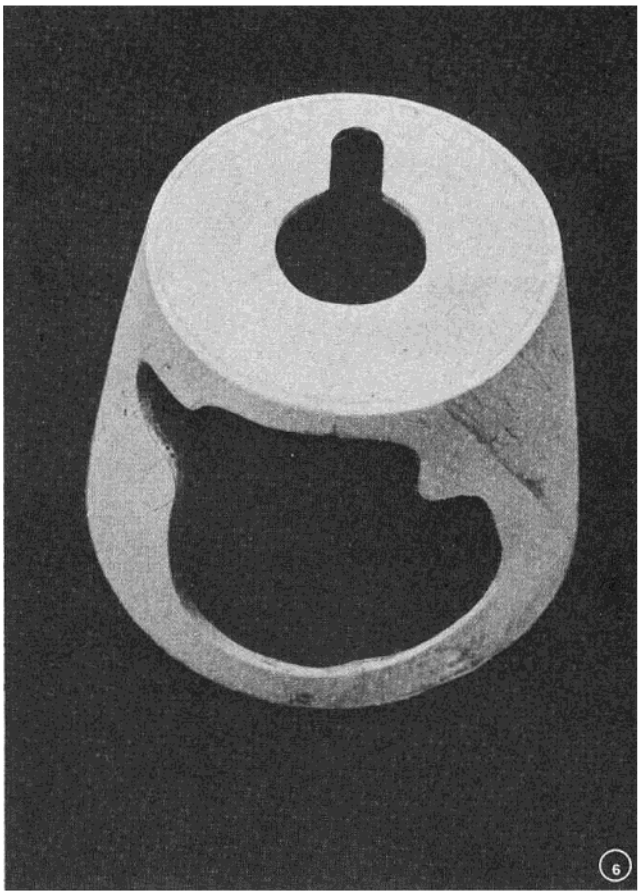
A 4" inside diameter cardboard mailing tube serves as the fuselage for the Tube-O-Roo. Paper packaging or carpet warehouses should have a tube to suit your needs. Look for a hard, but thin, paper tube not over 1/8" in thickness to hold weight down.

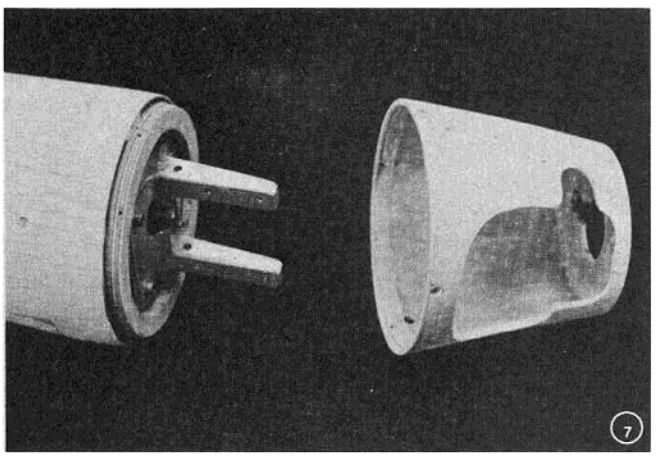
If you have decided to use MonoKote covering on the fuselage, then first sheet the tube with 1/16" or 1/32" balsa before marking the airfoil center section on the side of the fuselage as described in the last part of Wing Construction. **Note:** Use water base type contact cement on the foam wing only and lacquer-type contact cement on the balsa sheeting. If water base contact cement is used on balsa, it tends to bend and curl.

To cut out the wing saddle area, I used a band saw. To keep the tube from rolling, I cut out two square pieces of foam core with holes the diameter of the fuselage and slipped them on the fuselage, taped them tight, and made my cuts. If a band saw is not used, then either cut the wing saddle area with an X-Acto knife or a small coping saw.

Next fit the fuselage over the assembled wing and make any small adjustments to the wing saddle contour. Now is a good time to look inside the fuselage from the front opening and glue in the wing saddle doublers and the trailing edge hold-down rings and hardwood pieces. By looking inside the fuselage you can adjust everything for a perfect fit. Now is also a good time to finish the wing saddle area in whatever manner you choose.







(#5) Do not glue firewall in place until last, gives more room to reach inside to fit doublers, hook-up wing hold down, etc. (#6) Install engine, then cut a round 1/8" plywood piece to fit behind spinner back plate, make it 1/8" smaller in diameter than spinner to allow for two (2) wrap around sheets of balsa 1/16" each. Allow 1/16" space between back plate and plywood nose piece. Now make a paper pattern to fit between cowl hold ring and plywood piece behind spinner back plate. Cut two (2) pieces of 1/16" balsa to pattern shape, wet and wrap around forming cowl, hold in place with rubber bands until dry. Give final trim and glue first one in place to plywood behind spinner only if you want cowl removable. Then glue second sheet on top of the first. Fiberglass both inside and outside and drill four or five hold down screw holes. (#7) Cowling complete and ready to attach to firewall.

Next draw air intakes on each side of the fuselage and cut out with an X-Acto knife. To help guide the knife, cut out a hard paper or thin aluminum pattern and hold in place while cutting. After cutting out the air intakes, I soaked them in lacquer thinner to separate the balsa sheeting from the cardboard and simply reversed the contour of the balsa cut-outs and glued in place to create air intakes.

Before you can cut slots in the back of the fuselage for the vertical fin and horizontal stabilizer, tick marks must be made on the back of the fuselage to make sure that the tail section will, in fact, be horizontal and vertical in relation to the wing. To do this, simply cut out a circle of heavy paper to fit within the inside diameter of the fuselage, mark a vertical and horizontal line at dead center, slip the paper gauge in the end of the fuselage and then, holding a triangle against the end of the fuselage, adjust the vertical line on the round paper gauge to match the vertical line of the triangle. Make sure that the fuselage is resting snugly on the wing while doing this. Transfer the vertical and horizontal lines to the end of the fuselage; repeat the same thing to the front end of the tube so that the firewall, with attached engine mount, can be glued at the proper horizontal angle. Before gluing the firewall in place, make sure the engine mount (which is side mounted) has been previously drilled for landing gear wire.

Using this technique, the engine mount serves two functions: to hold the engine and to hold the landing gear wire. Make sure the plywood firewall has vertical and horizontal lines marked on it with the engine mounted dead center at a horizontal angle. Glue on the extra pieces behind the firewall as shown on plans. This gives extra gluing area and bearing to front hold-down dowels. Cowl hold-down ring can be glued on the firewall after the firewall is glued in place. With the firewall glued in place and the wing taped in position, drill two holes through the firewall and into the wing to install the leading edge hold-down dowels. Next drill through the centerline of the trailing edge to tap and thread a 1/4" x 20" nylon hold-down bolt.

To cut the slots in back of fuselage to accept the fin and stabilizer, I used a

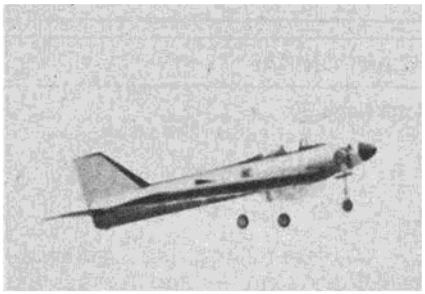


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table saw and bolted two circular blades together to give me a 1/4" cut. This worked beautifully, but if you do not have such an item at your disposal, lay the fueslage on a flat surface, put a pen on a block of wood and mark a 1/4" wide slot down the side of the fuselage where the tick marks are located. Make sure to mark 1/8" on each side of the tick marks to give a 1/4" slot, then tape a steel rule or other straight edge to serve as a guide for the knife or the saw and cut the openings in as far as necessary for the fin and stab to slide in place.

Tail sections are made from 1/4" balsa. I rounded off the leading edges and left the trailing edges flat. Since the tail sections slide in place, I covered them with MonoKote, left a 1/8" space of wood open where the fuselage would fit to serve as a glue joint area, and glued them in place last.

Cowling:

I designed the cowl to be removable. It is held down with five wood screws. Refer to construction photo #6 for information on the cowling construction. If you don't mind more open space around the engine to facilitate getting the engine in and out, I would recommend gluing the cowl in place permanently, since I have never had reason to remove it after many flights.

Canopy:

To install the Wing Mfg. canopy, tape sandpaper, rough side up, on top of the fuselage. Cut the canopy close to the depth desired and then rub back and forth until it seats itself to contour of the fuselage. Draw an outline of the canopy on top of the fuselage and cut a narrow groove to sit the canopy in and glue in place.

Finishing:

The Tube-O-Roo is finished in MonoKote covering all the way, except for the cowl.

Finished weight is approximately 6½ lbs.

Flight Characteristics:

The plane flies rather fast for a .45 size airplane. Rolls and inverted flight are great! I am not a pattern flyer, so I cannot judge it on precision maneuvers, but for an advanced Sunday flyer, I think you will truly enjoy its performance. Since the Tube-O-Roo lands somewhat faster than a straight wing airplane, just hold the nose up on approach like a real jet airplane for a nice landing. □