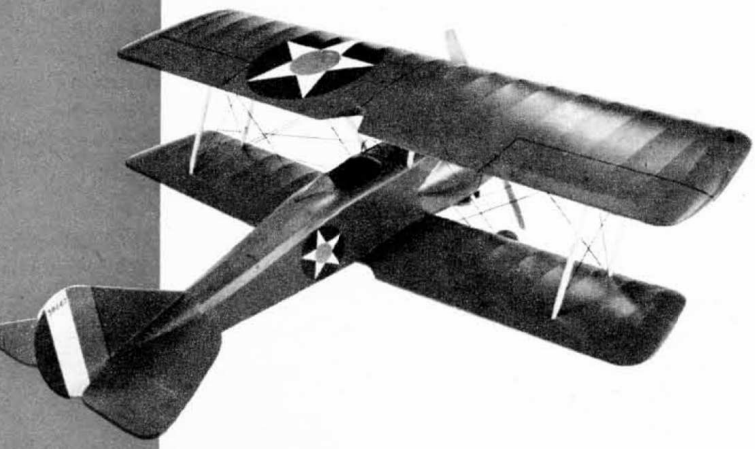
"Tommy" Scout

By WALTON HUGHES

During 1917 and 1918 five hundred and fifty of these frisky little pursuits built in Ithaca, N. Y. were delivered to U.S. Signal Corps. The S-4C Thomas-Morse was fitted with an 80 hp LeRhone rotary giving it 95 mph speed.



■ The United States did not do very much in military aviation till the last two years of the First World War. At this time we were training pilots to fly the fast French scouts over German lines. Our Curtiss primary trainers were far behind these ships in speed and performance, and left a large gap between fighter pilot training and combat flying.

The "Tommy" or Thomas-Morse Scout was designed to bridge this gap with high performance and maneuverability, but had less speed than the top-notch fighter planes. Large control surfaces combined with a lightweight airframe and engine gave the Tommy a good rate of climb and excellent maneuverability. Many of these ships were purchased by private owners after the war because of the small engine and resulting fuel economy.

The structure of this model Tommy was designed specifically to give good scale appearance. No spars show through on the wing and the ribs are of the correct number and spacing. A narrow leading edge and trailing edge are used so that they will not detract from the appearance. Wire struts for the upper wing and the landing gear wires are covered with white pine to duplicate the spruce struts on the original. Stringers are used in the correct locations and sheet balsa in the areas covered with aluminum.

On scale biplanes the top wing very often flips off at the first rough landing. The main problem is to

Here is one of the most appealing flying scale models ever presented in "AT"— the generous wing area and tail surfaces make it a "natural" for C/L operation

attach the wing firmly to the fuselage so it will resist being driven back or twisted off by a force on one wing tip. Wooden struts are too brittle to resist this twisting action and fail very quickly. Wire struts are strong enough but very difficult to install using J bolts or binding with wire into plywood bulkheads.

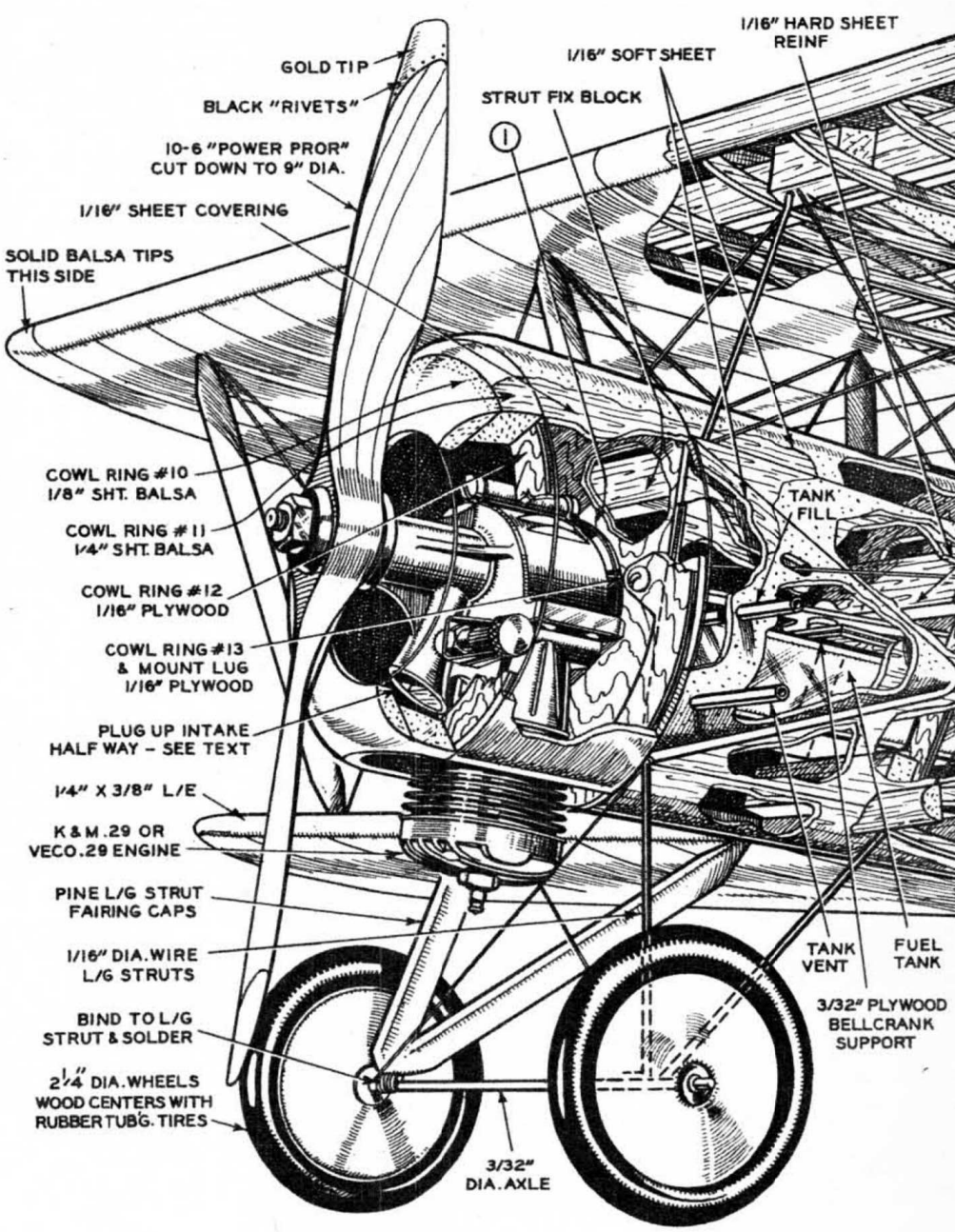
Our little Tommy sports a new type of construction that is quite strong and yet can be installed after the wings and fuselage have been completely covered and finished. The ends of the struts are wrapped with evenly spaced turns of copper wire and lightly soldered. A piece of glue-covered string is then wrapped in between the turns of copper wire and allowed to dry. Upon final assembly the string is again coated with glue and pushed into a hole in the fuselage and wing. When the glue is thoroughly dry this joint will withstand thirty pounds pull or more and also resist side pressure. Note that the cabane struts have a steel wire brace (X) between them to withstand the twisting action from the top wing.

Careful attention has been given in designing the structure to maintain proper balance. Note that the top wing on this model extends ahead of the firewall and nearly touches the propeller. In order to arrive at a correct balance with this forward wing position, the rear half of the fuselage and tail assembly must be kept extremely light. Also a large engine is used to add extra weight in the nose. The K&B 29 has double the power required but gives very steady performance with the intake plugged up halfway.

Notice in the weight table that the paper and paint job weighs 3½ oz. even though it was kept as light as possible for a good finish. The structure must be kept extremely light to overcome this extra weight. This is accomplished by using a 1/16" sheet balsa fuselage, hollow wing ribs, and radial motor mounts which eliminate heavy maple beam mounts. The stunt performance of the model compares well with the original ship.

The model has been put through consecutive inside loops, wing-overs, square loops and three and four leaf clovers. There is no tendency to mush regardless of how it is handled. We do not suggest inverted flying or outside loops.

Start construction with wings. Cut out a tin template to outside curve of rib and use this to slice ⅛" wide strips of sheet balsa. A separate template is required for top and bottom segments. Cut spars from hard ⅛" sheet with a straight edge and pin down to plans. Glue one half of each rib in position and allow to dry. Turn the assembly over and attach the remaining half of each rib, then add the leading and trailing edge.

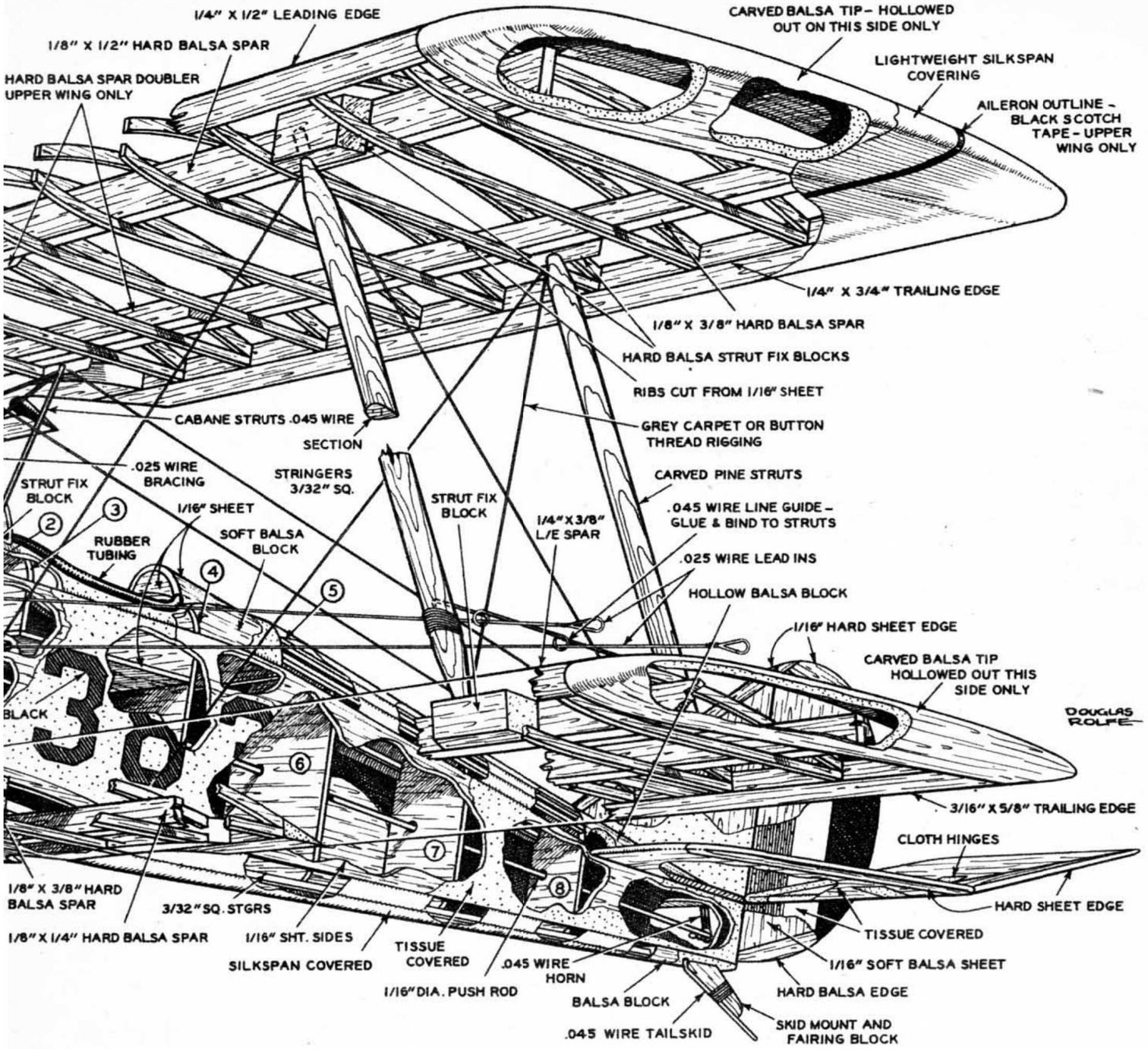


This wing assembly is much easier to build than it looks on paper. The ribs are very fast to cut out and require much less effort than cutting square slots in a one-piece rib. When making the bottom wing, splice the spars and leading edge together first; pin these in place on the plans and glue the ribs on, one half at a time.

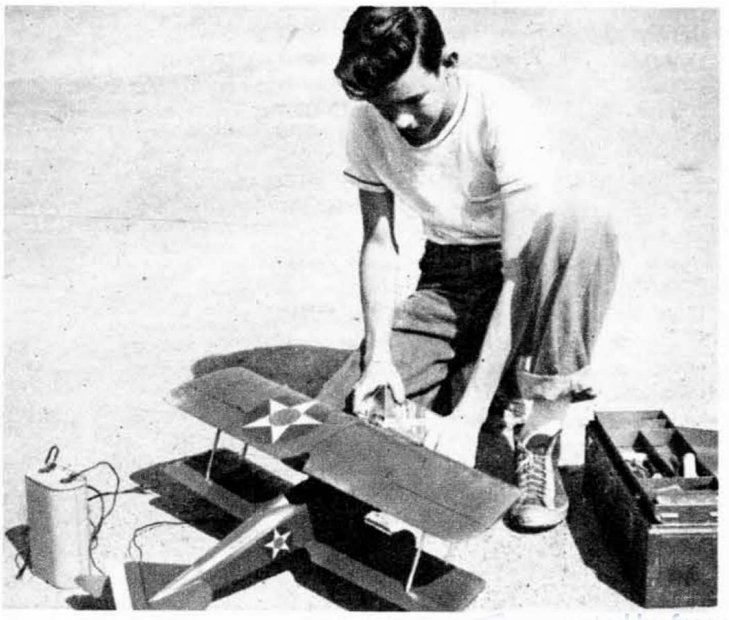
Tail surfaces are made up of soft 1/16" sheet balsa to reduce weight. A narrow edging of hard balsa is used to give strength and eliminate warps. Cut out the soft sheet and glue hardwood edge in position. When dry, cut outside outline and sand to a finish. Assemble elevator and stabilizer with cloth hinges, then fit wire control horn and attach to elevator with strips of silk and glue.

Start fuselage by cutting sides and then glue the reinforcement sheet to the inside between #1 and #2 bulkhead positions. Cut out bulkheads and add the ¼" balsa blocks to #1 and #2 bulkheads to act as strut anchors. Mount the engine on #1 bulkhead and put a nut plate on the back so that engine can be removed after ship is assembled.

Assemble sides and bulkheads, then put the tank in place through hole in #2 bulkhead. Carve wooden block to rear end of fuselage and fairing block at rear of cockpit. Add the tail surface and control system. Apply 1/16" sheet to the top and bottom of



She flashes by in a blur during the initial testing! Designer Walt Hughes reports that the S-4C Scout can whip through almost all the standard stunt pattern except for inverted flying and outside loops—with a beauty like this we'd keep our flying low and slow!



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the front section, being careful to mark strut positions and landing gear location on side of fuselage opposite the ¼" sheet.

After the sheeting is in place, drill holes for the struts. Glue a piece of silk to the firewall; then pull the ends back and glue them to the sides, top, and bottom of fuselage, pulling as tight as possible. This reinforces the firewall and stops any tendency to pull out.

A very light and simple construction is used on engine cowling. Cut out the two 1/16" plywood rings and sheet balsa rings as shown in stations 10 to 13. Glue 10, 11, and 12 together and allow to dry. Select a piece of 1/16" sheet balsa that will bend across the grain easily and cut four slices equal to length of sheeting on cowling. Glue these pieces together to form a long ribbon of cross-grained wood and allow to dry. Wrap this band around the plywood frame and cut to length so it will make a complete ring. Glue the ring together, holding with spring clothespins until glue dries. Glue this in place over the two plywood rings and the assembly is ready to sand.

If sheet should shrink any while glue is drying, steam slightly to expand so it can be assembled. Attach the assembly to the firewall with two small wood screws through mounting lugs on former 13. Cut out for cylinder, exhaust and needle valve. Glue the 1/16" sheet balsa formers to front of fuselage in line with engine cowling and cover with triangular pieces of 1/16" sheet balsa to form engine accessory cowling on side of fuselage. Sand to fair in with engine cowling.

Make up wire wing struts and landing gear braces as shown on separate details in plans. Note that ends are wrapped with copper wire, 1/32" space between each turn. Solder these ends and remove all the excess solder by taping on a wooden block while still hot. Bend the ends to angles shown in front view so wing struts will enter the fuselage at a 45 deg. angle, and the wing section will be vertical. Wrap the ends with string and glue between the turns of copper wire and allow to dry.

Assemble struts and top wing to check for proper alignment, making any changes necessary, and then disassemble again. Mount bottom wing on fuselage and fill center section with sheeting, where landing gear enters the wing surface, being careful to mark locations for landing gear struts. Drill holes through the sheeting into the ¼" balsa blocks, then assemble landing gear to check for proper alignment. When fitted properly, disassemble and set aside. The model is now ready to cover and paint.

Cover tail surface and all wooden parts with lightweight rubber band tissue. The wings and stringers sections on the fuselage should be dry-covered with lightweight Silkpan. Covering this wing structure wet will result in too much strain and a badly buckled trailing edge. Apply three or four coats of clear dope over the paper and then sand lightly. Apply two or three coats of talc and dope over the wood surfaces of the ship, and one thin coat on the papered areas. Sand very lightly over the papered areas with No. 320 paper, being

careful not to cut through to the ribs and stringers. Apply one coat of clear dope to fill pores and sand again. Follow with two or three coats of olive drab all over.

Add trim, using Trim Film for the insignia and large numbers. After the Trim Film is pasted on model, wipe firmly with a rubber squeegee cut from an old rubber tube. Keep rubber wet while wiping the Trim Film so it will not mar the surface. This removes all the bubbles and gives an even job. Add the ailerons using narrow strips of black Scotch Tape, then apply fuel proofer on all of the ship. It is best to use Aero Gloss primer on engine cowling and on firewall rather than talc and dope, as this will stand up under continuous contact with the fuel. The model is now ready for assembly.

Make a trial assembly of the top wing and all struts to see that everything fits properly, and then remove the wing. Glue wire wing struts into fuselage and add pine caps to make them look like wooden struts. Fill holes in the top wing with glue and coat the ends of struts, then push the top wing in place and line up.

Allow the center struts to dry for 24 hours, then spring the ends of wing slightly and add the end struts. Glue landing gear wires in place in fuselage and bind on the axle with copper wire and solder. Cover landing gear struts with wooden caps the same as cabane struts. Put in the rigging with carpet or heavy button thread and your ship is complete.

Before making any flights, check the model carefully for balance. The point indicated on the plans is the rearmost location for steady flight. Add lead in nose, if necessary, to bring the balance up to this location. Plug up one-half of the engine air intake with a small piece of white pine. The scale propellers shown on the plans operated with the wooden plug will give plenty of power for all maneuvers. Fly on .010 diameter lines, 55 feet long.

Bill of Materials

1. 5 pcs. 1/16"x3"x36" balsa: 1 hard, 3 medium, 1 soft. 2. 1 pc. ¼"x3"x36" hard balsa. 3. 1 pc. ⅛"x3"x36" hard balsa for spars. 4. 1 pc. ¾"x2" balsa, 24" long. 5. 1 pc. 1/16" plywood, 2"x6". 6. 1 pc. hard ⅛" plywood, 3"x4". 7. 3 pcs. 3/32" sq. balsa. 8. Pine board from box, for struts. 9. 1 pc. 3/32" steel wire, 6" long. 10. 1 pc. 1/16" steel wire, 36" long. 11. 1 pc. .045" wire, 36" long. 12. 2 pcs. .025" wire, 36" long. 13. Cloth for hinges. 14. 1 pc. silk, 12" square. 15. 1 pc. ⅛" rubber tube, 12" long. 16. 1 pc. 5/16" O.D. rubber tube for tires, 14" long. 17. Fuel tank. 18. Bellcrank. 19. K&B 29 or Veco .29 engine. 20. 10/6 Power prop. 21. Trim Film; red, white, blue, black. 22. Olive drab, gold and clear dope, glue. 23. Light Silkspan and rubber band tissue.

Weight Analysis

1. Engine, 7.0 oz. 2. Wings, 2.6 oz. 3. Tank, 1.6 oz. 4. Fuselage, 3.0 oz. 5. Tail assembly, .43 oz. 6. Landing gear frame, .48 oz. 7. Wire wing struts, .27 oz. 8. Cowling, .30 oz. 9. Wheels, 1.29 oz. 10. Wood struts and cap, .50 oz. 11. Paint, 3.50 oz. Total weight, 20.97 oz.