

# THE DOUGLAS MAILPLANE

Man-sized free flight recalls the days of helmets and goggles and wind in the wires.

THE INAUGURATION of the Air Mail Service over 40 years ago was an epic event which foreshadowed commercial air transportation. Men and machines of the United States Postal Service began to fly hazardous schedules almost regardless of weather. Before the days of crude beacon lights, pilots were guided at night by bonfires. One of the first commercial carriers was Western Air Express; its initial airplane was the Douglas M2 Mailplane. (See p. 28, Dec. 1969 AAM, "The Douglas Mailplane," by Paul R. Matt, for detailed drawings.)

Since biplanes are outstanding performers, the balanced design of the M2 prototype makes for a fine-flying model. Fidelity to scale has been maintained, with several small exceptions. Power ranges from 09 to 12 displacement.

#### Construction

The model is designed in three assembly units: wing and main landing gear, fuselage, and tail unit. The ship can be disassembled for more sensitive adjustment, since slight incidence changes are needed for varying winds. A removal lid provides access to working gear inside the fuselage.

General building suggestions are as follows. For a strong and warp-resistant model, use only the balsa specified. Do not force oversize parts into the framework during assembly. When the assembled unit has been removed from the plan, go back over all joints with cement. (I find Duco cement produces strong joints.)

Fuselage: Assemble the simple box frame with its cut-out lower wing mount, then build both sides from hard balsa simultaneously over the plan. After the side panels are assembled and the joints dry, thoroughly moisten the curving longeron and allow it to dry. This prevents the straight upper longerons from taking on a slight bend. Remove the sides from the plan and put in the upper and lower horizontal crosspieces. Cement the rear uprights together and install the set of crosspieces to the rear. When that joint has dried, put in the next set and so on.

With the main frame finished, attach medium-grade sheet balsa formers and the adjoining stringers. Attach upper balsa covering panels and balsa planking as specified. The cockpit cover, which is built in two half-size pieces that meet lengthwise in

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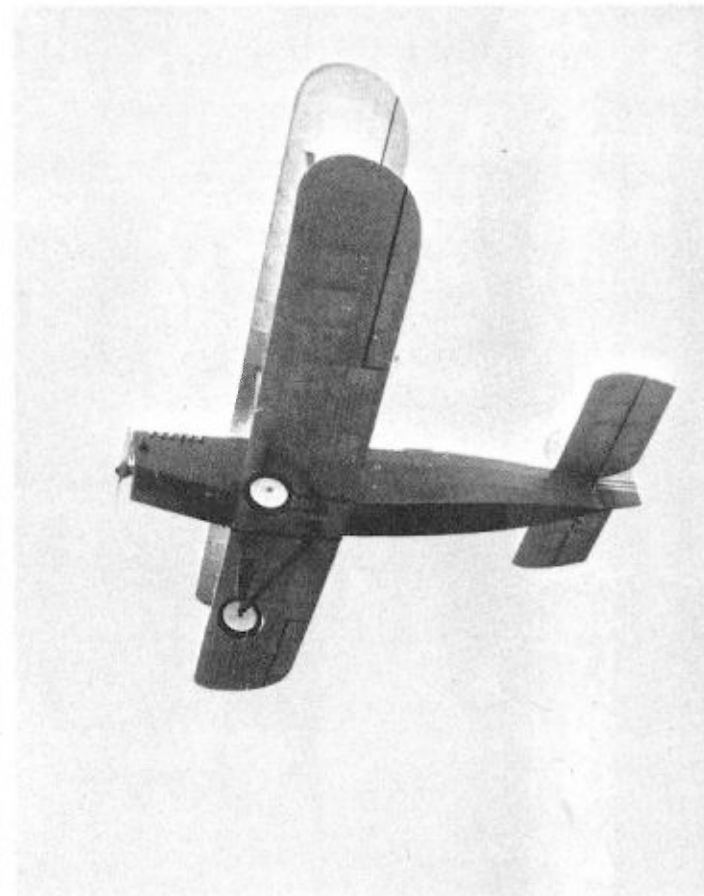
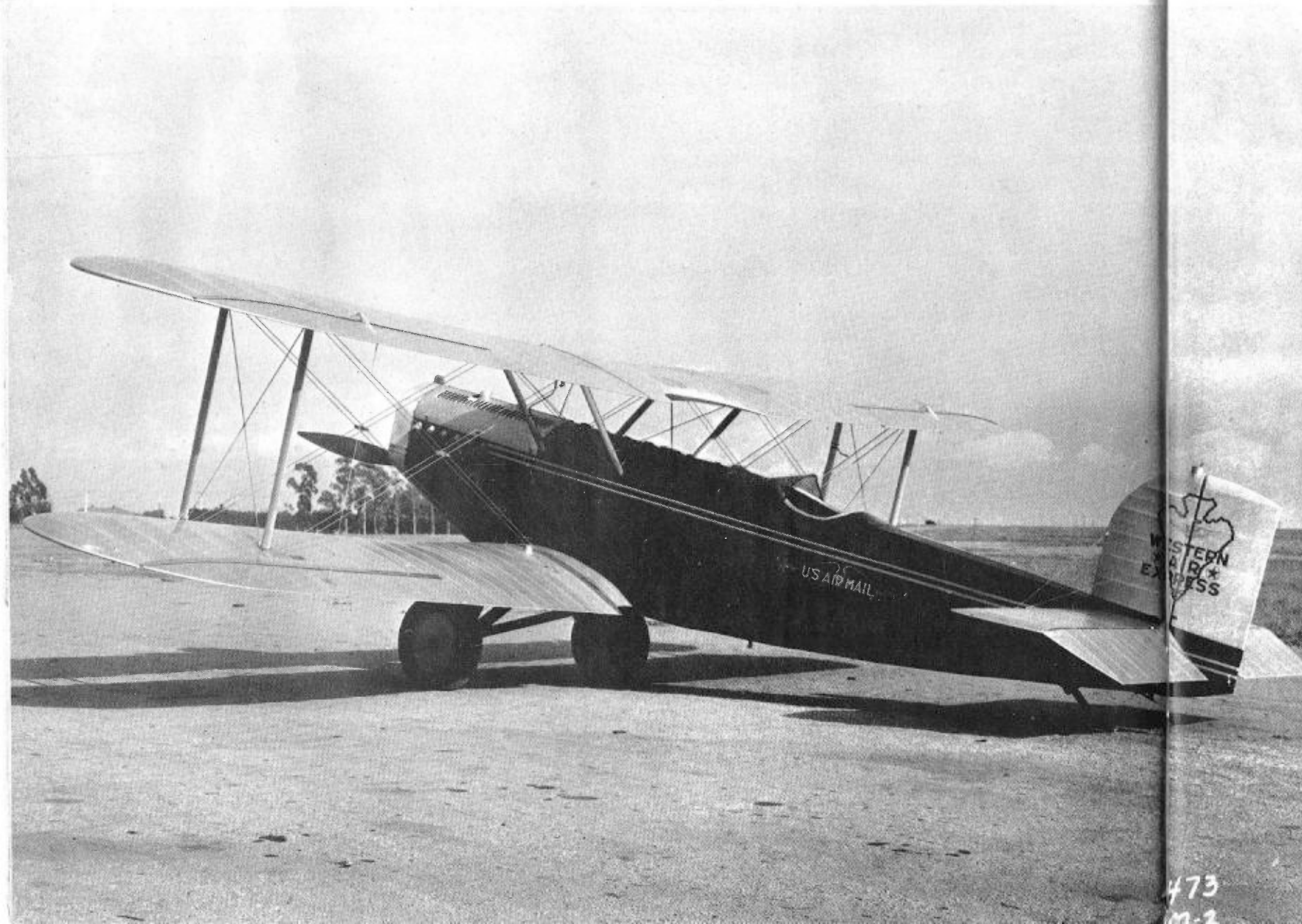
the center, is moistened before it is attached. Lengths of dowel are securely cemented in place to anchor rubber bands for mounting the wing and tail units. A tail skid is bent to shape and then put into the fuselage with a strip of plywood to hold it in position.

Insert the nose end pieces which carry the motor mounts and then cement them in place. Plan spacing is for an O.S. 09 engine, although this model will take up to a 12. Drill mounting bolt holes with a slightly undersized bit so that when the bolts are screwed into position they will be tight. Shape and attach the lower balsa block nose piece.

Put the upper access lid together and shape. Basswood ends and balsa retainers are added to insure a snug fit. The nose end assembly with its basswood side pieces and grill adds realism and beauty to the model.

Wing and Landing Gear: Wing units are built up directly over the plan. Use medium hard balsa for all pieces except the ribs, which are hard balsa.

Lay out the outline pieces one panel at a time. Then put the ribs into their positions. Remove the frame from the plan to insert the spars. Attach leading edge sheeting, working



Far left: 1926 photo of an early M-2 biplane. For more details of this great plane, see Paul Matt's article in Dec. 1969 AAM. Left: Not highly detailed but much flown, author's model glides overhead. For a big-winged biplane, it is quite steady in wind when adjusted for penetration.

from front to rear, trimming a section of the upper tip piece to facilitate tapering the wing tip assembly. When the sheeting is anchored at the tip, a nice upsweep will result.

When assembling the lower center panel, the entire panel is planked over with two pieces which meet at the center rib. The panel is strengthened by the upper planking of medium hard sheet balsa.

After dihedral gussets are put in place, cement the wing panels together at their various rib joinings. Put in the basswood dihedral bracing as illustrated. Be sure each wing tip has the amount of dihedral indicated.

Cement securely pieces to hold upper and lower ends of the outer wing struts. Shape outer struts to their symmetrical streamline cross section but do not mount them at this time.

To form the inner struts, bend the specified wire as shown in the plan. Wrap the bent pieces with thin copper wire at joints;

then pin each strut in position on a board to insure proper alignment. Solder and fit in the proper lengths with two pieces each of medium sheet balsa cut to size and trimmed to take the wire pieces easily. Assemble the fairings and shape to streamlined cross sections.

Drill holes in the fuselage and underside of the wing to accommodate strut ends. Do not drill deeper than the length required for the plastic tubing insert, or the insert will slip its mount. Cement the tubing into the mount holes, taking care not to get cement in the openings.

Make and bend the landing gear struts, using the measurements given on the plan. The upper ends of the struts are mounted to the lower wing spars and backed up by basswood. Wrap the entire spar assembly wall with strong thread and cement it to the assembly on all sides. Fair in the front legs (except for the shock fairing pad) with

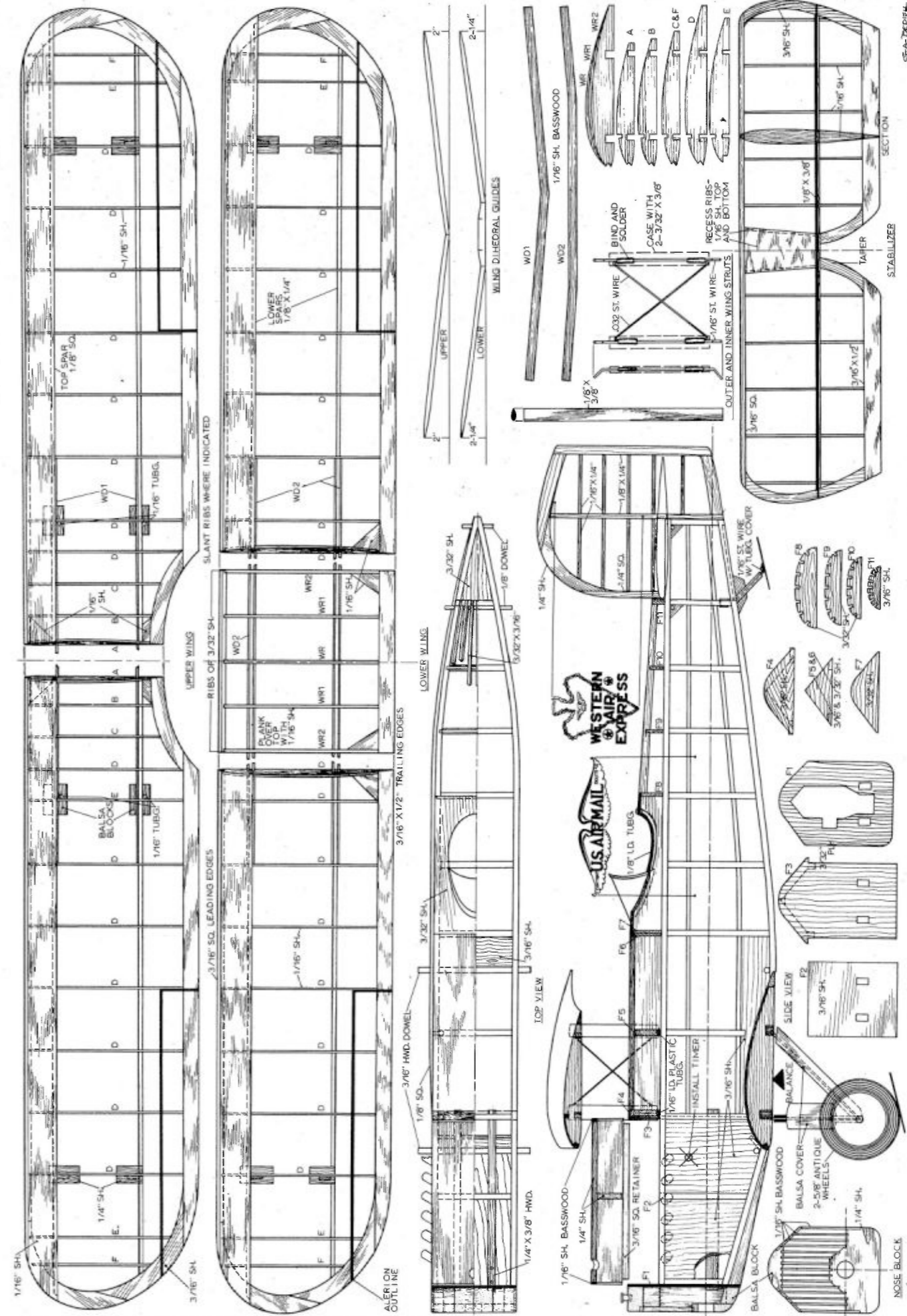
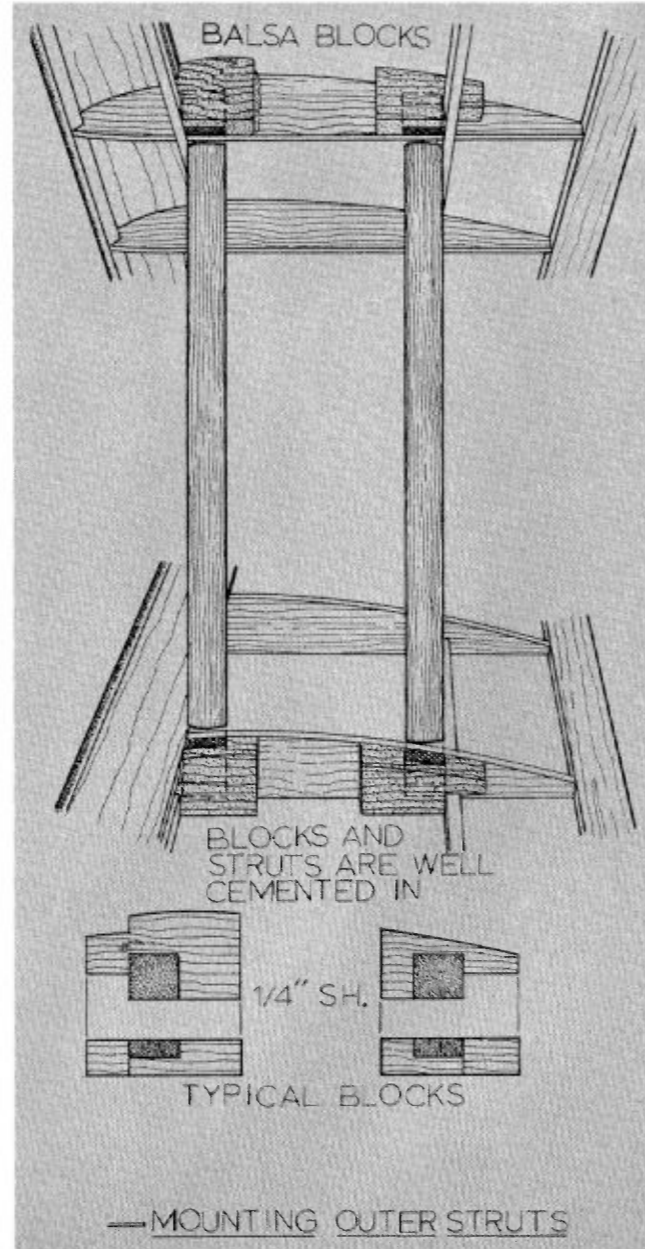
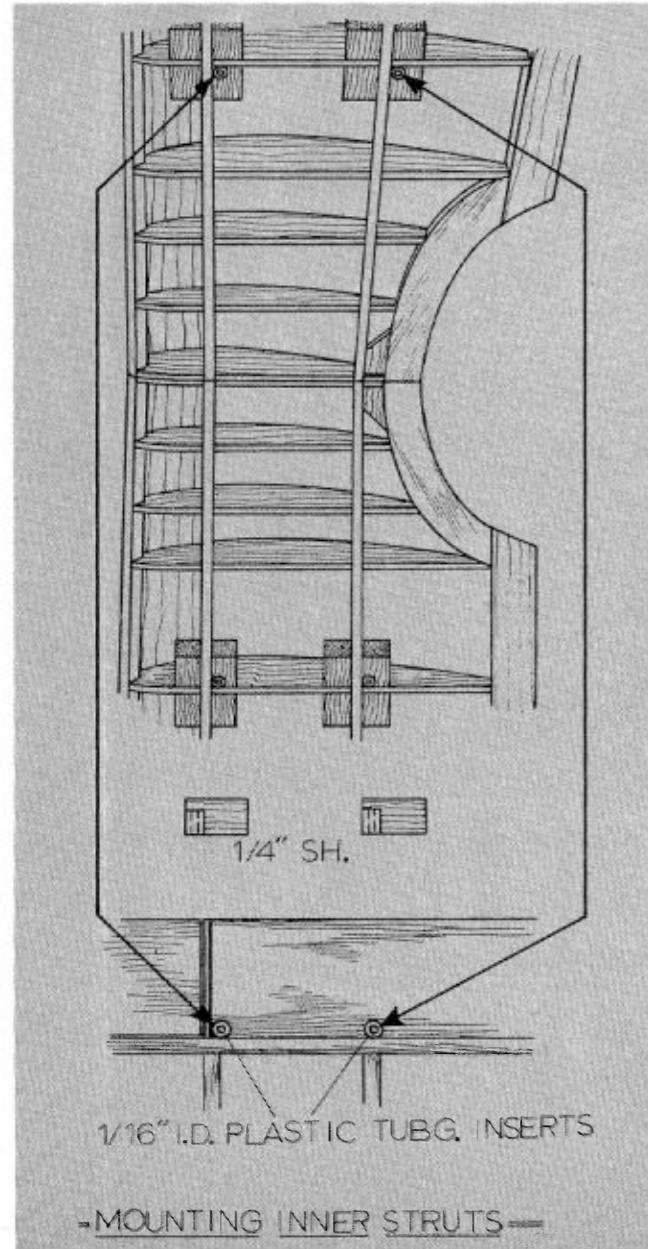
neoprene tubing. Wrap strut leg ends with fine copper wire and solder them together, then fair in the remainder of the strut legs in a manner similar to that of the inner wing struts.

The wing and landing gear assembly is light, yet rugged, and to scale.

Empennage: Construct the rudder of medium hard balsa directly over the plan. The stabilizer and elevators, also of medium hard balsa, are built up as a single unit. Block up leading and trailing edges with pieces of scrap to a thickness which will provide clearance of the symmetrical airfoil. When the unit has dried, remove from the plan and plank upper and lower center sections.

Glue-tack the rudder to the stabilizer, then fit and shape fillets from soft balsa blocks to streamline the upper rear fuselage into the rudder and stabilizer mounting.

Preparation for Covering: Slightly round (Continued on page 56)



## Douglas Mailplane

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the upper fuselage pieces at the top and sides as shown. Wing leading edges and tips, as well as tail surface extremities, are shaped to carry out the streamlining. Lightly sand all exposed surfaces to the desired finish with 2/0 garnet paper. Remove all cement knots and other obstructions which would detract from a smooth appearance.

**Assembling and Balancing Framework:** Fit the components together but do not cement. Attach the wings as a complete unit by mounting the outer wing struts into their respective positions. Loop rubber bands around the lower wing mounting, then put the center struts in place. Flex the upper wing up slightly to ease this mounting. Add the engine, wheels, timer, and tail as a temporary assembly.



Deviations from scale are increased dihedral and stabilizer area. Makes trimming easier.

Balance the model around its lateral axis by holding it up in line with the balance point marked on the plan. Add tail weight until the model is resting just less than level, with the nose down a few degrees. Cement the necessary weight to the filled-in section at the rear of the tailskid.

With one finger against the front of the engine crankshaft and a finger of the opposite hand at the base of the fuselage rear of the tailskid, hold the model to see if there is any roll about the longitudinal axis. Correct such a roll by cementing small weights inside the wing tips. This balance is important.

**Covering and Finishing:** Choice of covering material is up to the builder. I recommend lightweight Japanese silk, which is durable yet takes the dope finish well. Cover the model, using one piece of material on each plane surface or component. Dope the silk covering around all the struts to strengthen their surfaces.

When the covering has been water shrunk and dried thoroughly, put on two coats of clear nitrate dope with brush or spray applicator. Where the silk is joined to balsa,

go over all surfaces lightly with 2/0 garnet paper to remove rough spots and edges.

For the color scheme, study photographs of the model and the photographs and drawings which accompany the Paul R. Matt article. Apply two coats or more of the appropriate dark red and silver. If silver dope is not available, buy ground aluminum powder from a paint store and add it to clear dope. Fuselage striping starts immediately behind the engine exhausts. Two silver stripes 1/8" wide and 1/8" apart extend out to rudder tip. Full-size insignia patterns are on the plan. Aileron, rudder and elevator outlines are masked out and doped with black dope.

Dummy exhaust stacks are of aluminum tubing lengths inserted and cemented into the fuselage sides. They also can be made up of dowel lengths or balsa.

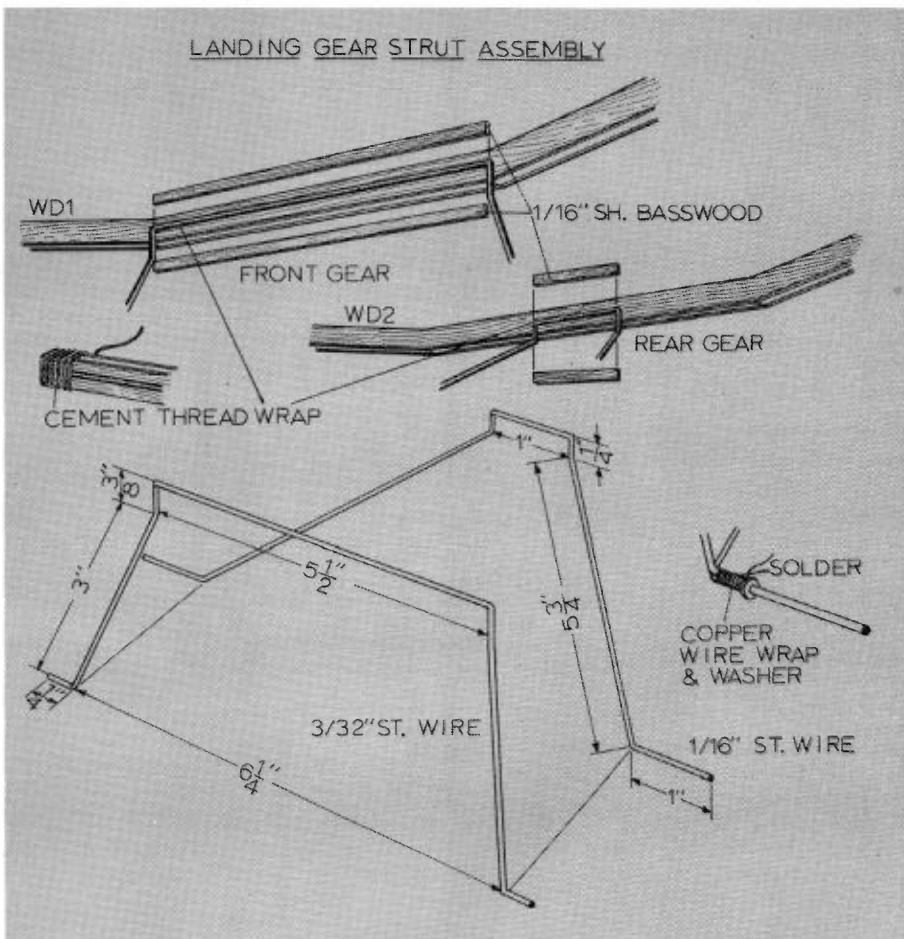
**Assembly:** Put the engine system with timer in position. (To provide slight downthrust, place a standard washer for an

opposite (above) receiving socket holes. Put cement in the socket holes, not on the struts and attach the upper wing. Immediately measure at intervals to be sure the wings are at equal distances from each other, on both right and left sides. Let the assembly dry thoroughly. Use .032 steel wire for the simulated X bracing. Cement the rudder into the groove atop the stabilizer.

**Flying:** Rebalance the model for final lateral and longitudinal trim. Take plenty of time in test flying to insure a longer life for the model. Biplanes are sensitive to wind. Under power they will zoom, so be prepared by having the model fully adjusted before tackling a windy day.

Select a calm day and, if possible, find a field that has grass to cushion hard landings. For a calm day, incidence usually is 1/16" positive placed between wing trailing edge and fuselage.

To test glide, trot forward, then give the



engine mounting bolt between the rear engine crankcase mount and motor bearer.) Snap on the engine unit access cover to complete this unit. Mount a celluloid windshield to the front of the cockpit opening, then split a length of neoprene tubing lengthwise through one thickness and roll this over the remaining edge of the opening.

When mounting the antique wheels with soldered washer retainers, temporarily put a layer of thin cardstock between the wheel and the washer to prevent scorching the wheel.

Assemble the wing panels by first cementing into position the lower ends of the outer struts, accurately aligning them vertically upwards. Then open up the

model a slight downward inclination and release it with a medium force throw. Aim for a landing about 25 feet ahead. Get an even glide path into prevailing wind. For rudder trim, shift the tail section slightly. I turn my model to go right, I leave the rudder straight.

Propeller for flight is an 8-3, preferably wooden. In the first power flights, have the engine running about half-speed and launch model from a slow trot directly into any breeze. The ship should climb slightly to the right and gain altitude. A left turn is permissible, provided it is not a tight spiral. As power is increased, a slight spiral will develop, so offset rudder to take any tight spiral out of low-power flights.