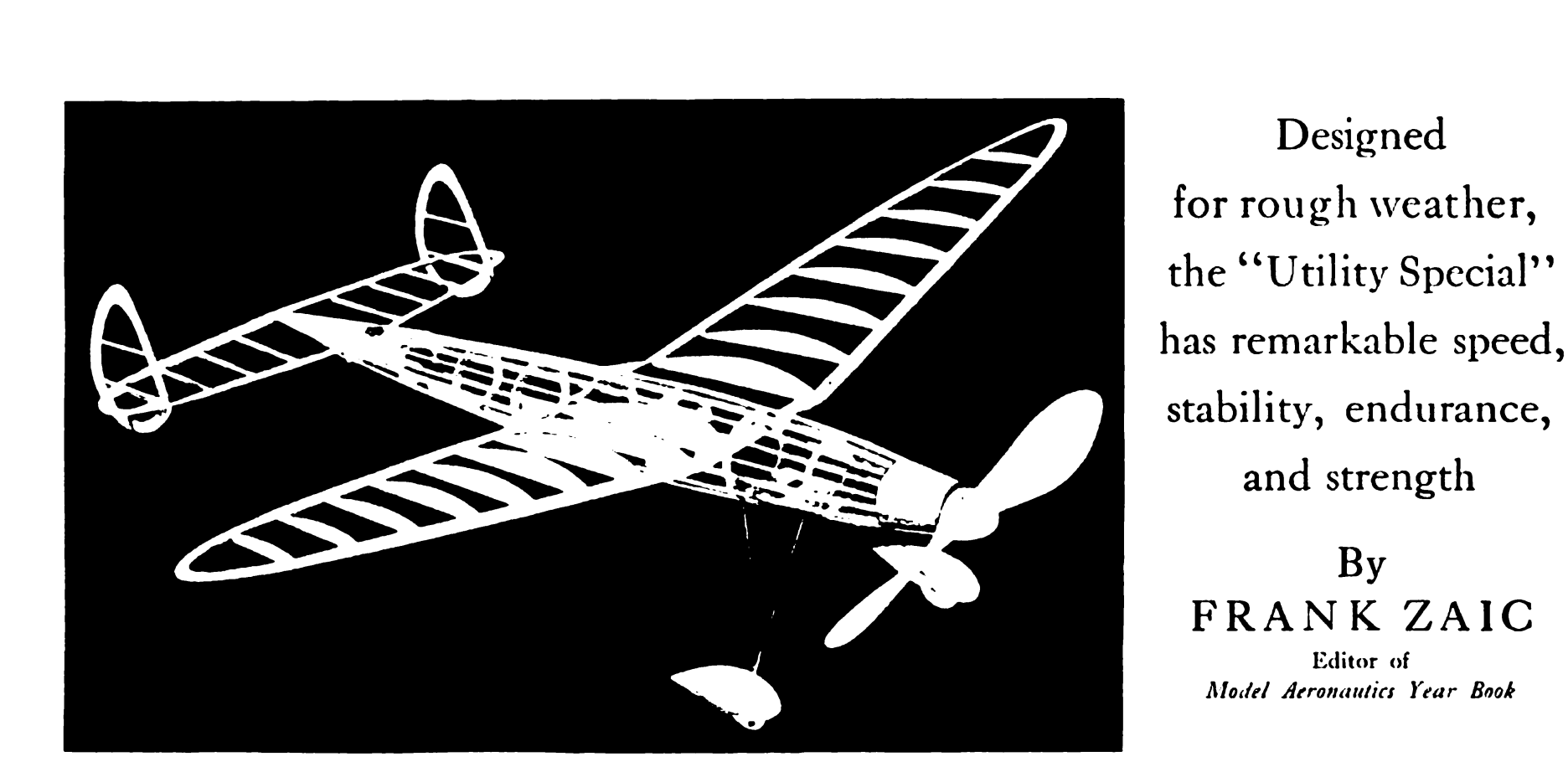


Scale drawings of principal parts and sketches showing various constructional details. Zaic made the design, and Roger Hammer built the model



Designed for rough weather, the "Utility Special" has remarkable speed, stability, endurance, and strength

By FRANK ZAIC
Editor of Model Aeronautics Year Book

THIS NEW Flying Model WON'T CRACK UP

SPEEDY and extraordinarily stable, this new streamline model airplane, known as the "Utility Special," is a fine design to open the season's flying. On normal power it will average flights from half a minute upward, and by the addition of a few extra strands of rubber it can be made to buck stiff winds or fly at racing speed. The materials cost about 50 or 60 cents.

Fuselage: Laminate 1/64-in. balsa sheets for the entire set of bulkheads. When the cement has set, tack each bulkhead to a drawing board and mark the outline, longeron slots, and stringer marks. Trim and cut the slots with a razor.

Select four matched longerons. Mark the bulkhead spacings while all are held together. Cement longerons to bulkheads 4 and 5. Let the cement set well. Then cement the rest of the bulkheads, working from center towards ends. Keep the fuselage lined up. The 1-16-in. square stringers are next cemented so that they are superimposed above the marked points on the bulkheads. Trim longerons flush with front bulkhead, and cement an extra



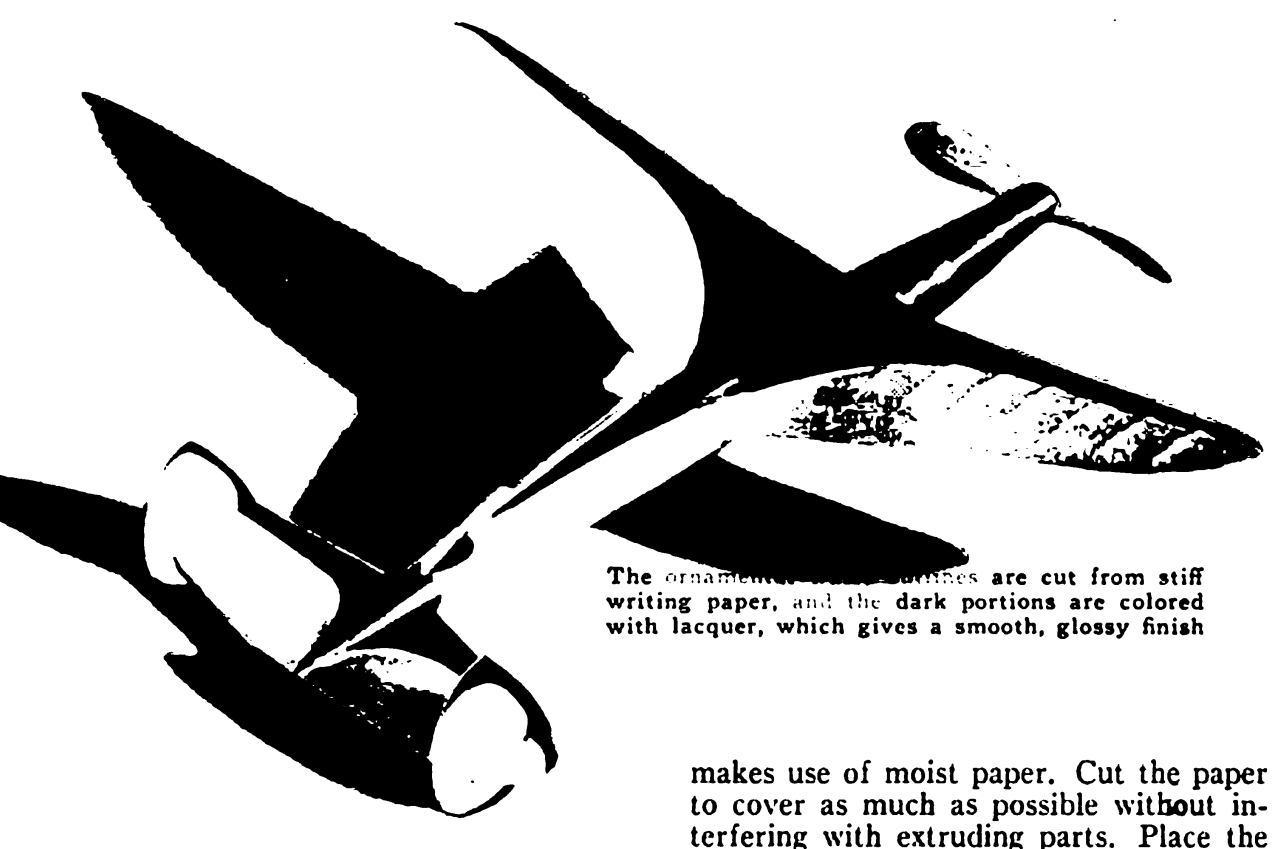
The stabilizer also is on the center line and the rudders extend above and below it. Every feature has been planned to give utmost efficiency.

MAY, 1937

sheet without slots in front of them. In rear, trim longerons and stringer to a point, cement them together, and cut off slightly to accommodate trailing edge of stabilizer. The 1/64-in. sheet covering is applied after stabilizer and front plug are made.

Landing Gear. Make the laminated platform and cement to bulkheads and stringers. Cut and bend the wire struts. Cement them to the platform and reinforce with wire staples. After the cement has set, the lower wire extremities are bound together very tightly with rubber bands. The streamline "pants" are made by cutting the sides and center to shape and cementing them together. Standard hardwood wheels are used. Set the pants parallel to the fuselage and fasten them to the wire with a generous amount of cement. To line up landing gear, cement a long strip of balsa on top of the center longerons just in front of the bulkhead and measure up from table to each end. Keep the strip in place to check the wing and stabilizer during the later assembly.

Wing. This is built in one piece, but



The ornamentation is cut from stiff writing paper, and the dark portions are colored with lacquer, which gives a smooth, glossy finish.



Ready for a rise-off-ground flight. Tested in a fresh breeze the model gave flights from thirty-five seconds to a full minute.

the center or flat portion is made rather loosely as it has to be taken apart and reassembled on the fuselage. Draw a full-size plan. Cut all ribs to same size, and shape the leading and trailing edges. Now superimpose the spars over the full-size drawing and hold them with pins while the ribs are tapered and cemented. Note that the spars are cut in three sections. Use cement generously while placing ribs. Be sure to shape tips well to reduce drag.

The dihedral angle is made by raising the wing tips $\frac{1}{8}$ in. and beveling the center and the outer-panel spars at their junction to the correct angle for a butt joint.

Separate center section of wing from the assembly and let one rib hold the spars to correct spacing. Pass the spars through the fuselage stringers and cement the front spar to bulkhead 4. Make certain the spars are parallel to the line-up strip. Replace the rib, and also cement the ribs which nestle against the fuselage. The outer two panels are joined to the center section. Check the dihedral by noting the distance from tips to table; also correct any difference in incidence. If you are doubtful of the center, strengthen the joint with a bamboo sliver. Cover top of center portion with stiff writing paper, and cement the corner fillets as shown.

The rudder outline is cut from 1/16-in. sheet, as are the stabilizer wing tips. The stabilizer is made in one piece with a temporary center joint, which has to be broken and recemented when the stabilizer is inserted behind bulkhead 10 and below the center longerons. Note that the trailing edge continues the fuselage line, and that

the longerons and stringers butt against the inside of this spar. This setting provides the needed negative adjustment. The rudders are cemented to the stabilizer after the stabilizer is covered.

Propeller and Nose Plug. Cut the propeller blank from a piece of hard balsa. The blades are very wide and set at low pitch to produce a powerful forward thrust with minimum torque. The spinner is an integral part of the propeller. The front portion is cut and recemented after it is hollowed out and the free-wheeling device cemented in place.

The propeller is carved by finishing the top camber first and then cutting the lower camber, which is about 3/32 in. deep. Give the blades a definite airfoil section. The final touch is to "dope" and sandpaper the blades. To give extra strength, cover the propeller with writing paper. Notice that a piece of aluminum is cemented on the back of the propeller to form a dust-free receptacle for the ball-bearing washer.

The nose plug is made as shown. The front and rear aluminum plates have crimped edges to provide more cementing surface. The rim is 1/64-in. sheet balsa. Be sure the plug fits snugly in the bulkhead and is flat against it.

Covering. The front and rear balsa coverings are now cemented. On the front, the longerons and stringers are cut in 1/64 in. to form a smooth continuous surface after the sheet is cemented in place. Note the overlap over the nose plug. The opening in the rear for the insertion and removal of the rubber is cut with a sharp razor. When the trimming is completed, coat the edges with several coats of cement.

The best way to cover the model is to follow the Bunker system, which

makes use of moist paper. Cut the paper to cover as much as possible without interfering with extruding parts. Place the paper on a cloth and spray it with a fine mist until moist. Brush a thick coat of dope on the extreme longerons which the paper can reach. Take the sheet in both hands, line up for the center, and press the paper onto the fuselage. Wing and tail are covered so that the grain of the paper is spanwise.

Spray with fine water mist to remove creases and wrinkles. When dry, dope the entire model with regular model dope. The color scheme used on the original model is yellow paper with red lacquer trimming. The balsa can be finished by doping several times with intermediate sandings, and finally lacquering.

Flying. The initial power is six strands of $\frac{1}{8}$ -in. flat rubber, placed by stringing it through the fuselage with a string. Check the center of gravity, which should be about $\frac{1}{4}$ in. behind bulkhead 5. If it is off too much, correct by adding modeling clay to the appropriate side. Now place the model on a smooth floor, raise the tail until the fuselage is parallel with the ground, and give it a straight-forward shove. A correctly balanced model will rise a few inches and make a long glide. Any stalling and sharp-turning tendencies should be checked before making further tests. Now stoop and glide the model a few feet above the ground. Correct disturbing tendencies. Next glide from shoulder height.

If everything seems all right, wind the model about 100 turns and let it take off the ground. It should rise up a few feet after a moderate run. When power slackens, it should assume a good gliding position. Correct excessive torque banking by giving the left wing a slight wash-in, and warp the rudders for a right turn. Keep on increasing the number of turns.

The model is now ready for geared-winder turns. The rubber is wound by inserting an S-hook between the rubber and the propeller shaft. Be sure to use lubricant and also remember to allow the rubber to have few inches of elasticity.

This design can be readily converted into a contest racer by reducing the area of the wing and stabilizer, by thinning the airfoil section, by substituting smaller and thinner wheels, and also by discarding the pants. The dihedral and the rudders can be the same size.

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