And now for all radio control fans tuned into this station... a quick course in ZUEology

by National Jr-Sr Rudder-Only winner Bill Wischer (with Pop)

■ Although "Zue" was designed as a contest model, she's a sport flier as well. Basically Zue is an expendable type, not too elaborate or expensive. Maneuverable and light, yet she is rugged enough to withstand rough landings and high speed. In the early years of R/C it was a rule that too much power was poison. This rule is still valid today, with the exception that high power can be used if it is controllable. Zue would fly nicely with a .19 engine, and with a K&B .35 R/C is definitely over-powered, but a reliable throttle control makes it a fairly mild airplane.

There are many methods available for engine speed control; we chose a pulse omission detector to operate a three position servo for the throttle. Under noisy contest conditions it is easy to reach the definite throttle positions of a 3P servo, but some fliers might prefer trimmable control for its fail-safe feature.

A single-geared Mighty Midget pulses the rudder on Zue with no difficulty, even though speeds are quite high in a dive. For stunts it is important to make full use of the MM with leverage that will result in a maximum armature rotation for the desired rudder movement 30° each side of center. This means no stops on the motor, and only the lightest of rubber band centering. A stiff torque rod is a necessity since any twist here would permit the rudder to blow back in the slipstream with loss of control.

A tricycle gear can be a headache on a rudder-only airplane, since they seem to land nose down most of the time. Zue's first nose gear was 1/8" dia. wire and had a short life. The plans show 5/32" dia. wire which has 1-1/2 times the cross section area. In spite of shortcomings the trike gear was used because of its excellent ground handling. Straight line takeoffs are really a snap, and you can shoot touch and go landings all day. A friction type nose wheel "drag" brake was used to get those all-important points for semi-proto takeoffs. Set this just tight enough to stop forward motion with engine idling.

A typical contest flight begins with taxiing out out the runway for the necessary 50 feet in medium speed. Reduce throttle to idle and the nose wheel brake will stop the plane, after which we take off and climb to 100 feet altitude in high speed. Then reduce to an engine speed which will result in a slight climb for the pattern, since some altitude is lost on all turns with a rudder-only plane. Throttle is advanced to high for the stunt maneuvers. Sufficient altitude is reached in a matter of seconds, with a lusty .35 in the nose, and in minutes Zue would be out of sight straight up. For maximum contest points keep to a lower level where the judges can see your maneuvers.

A one turn spin is required for successive loops, and a half turn for an Immelmann, wing over, rolls, or split S. Too many turns on the final approach in landing are certain to spoil your touch and go, so keep it straight. You will find that Zue does not bounce on landing but sticks to the runway instead.

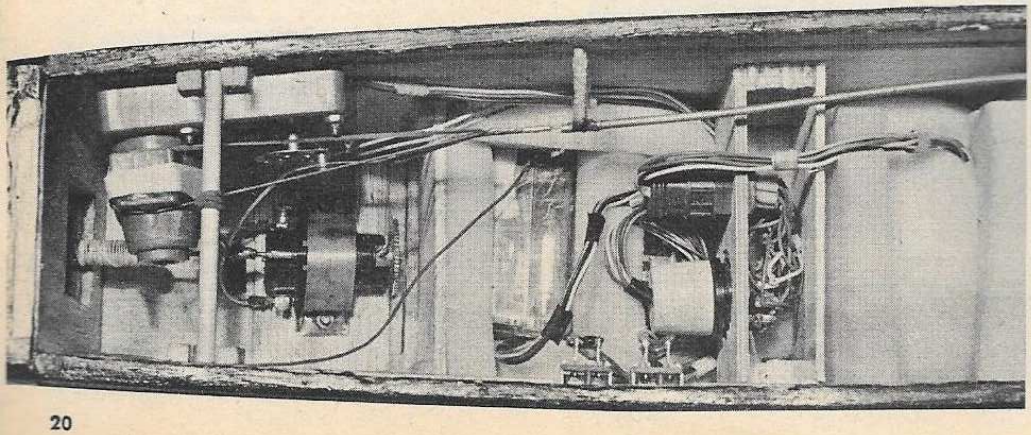
After slowing down slightly, open the throttle for another circuit and approach to the spot landing circle. Here only experience can help you do a good job. To shoot good spot landings means hours spent at the local field to acquire the skill before entering a contest.

CONSTRUCTION

Fuselage sides are cut from 3/32" x 48" medium balsa. If the 48" length is not available, splice carefully. Add a strip along the bottom to bring fuselage depth to 4-1/2". The 1/8" nose doublers should be laminated to the sides with contact cement, applying two coats to both surfaces before bringing them together. Formers 2 & 3 are laminated by contact cementing 1/8" hard balsa to 1/16" plywood.

Bending the 5/32" music wire landing gear leg to shape requires muscle power. This can best be done with the aid of a vise and heavy pliers, wrapping the loop around a 1/2" dia. rod. This is then laminated into a sandwich with outer layers of plywood to make former No. 1. Use white glue and heavy pressure for several hours to assure strength in this part because it absorbs a lot of abuse in landing. Formers 1 and 2 are cemented between fuselage sides, followed by engine mounts and lower nose blocks; make certain that this assembly is square while the glue dries. Then the fuselage sides are bent inward to meet former 3 and tail block. 1/8" x 1/4" longerons and upright braces are added. Cut the rear landing gear mount from 1/8" plywood laminated to produce the 1/8" slots to take the 1/8" dia. wire. Cement in place on fuselage bottom, then fill in the areas fore and aft with 3/32" balsa bottom planking. Add nose blocks and gusset blocks to former 1. Cement the top deck using 3/32" balsa. Add stabilizer mounts, wing mount blocks, and all dowels to complete the fuselage structure.

Build top front cowling from blocks and sheets, sanding to shape. This is



National R-0 Champ William Wischer holds "Zue"; innards photoed with engine toward right. Full size plans are on Group Plan #561 from Hobby Helpers, 1543 Stillwell Avenue, New York 61, N. Y. ($1.10).

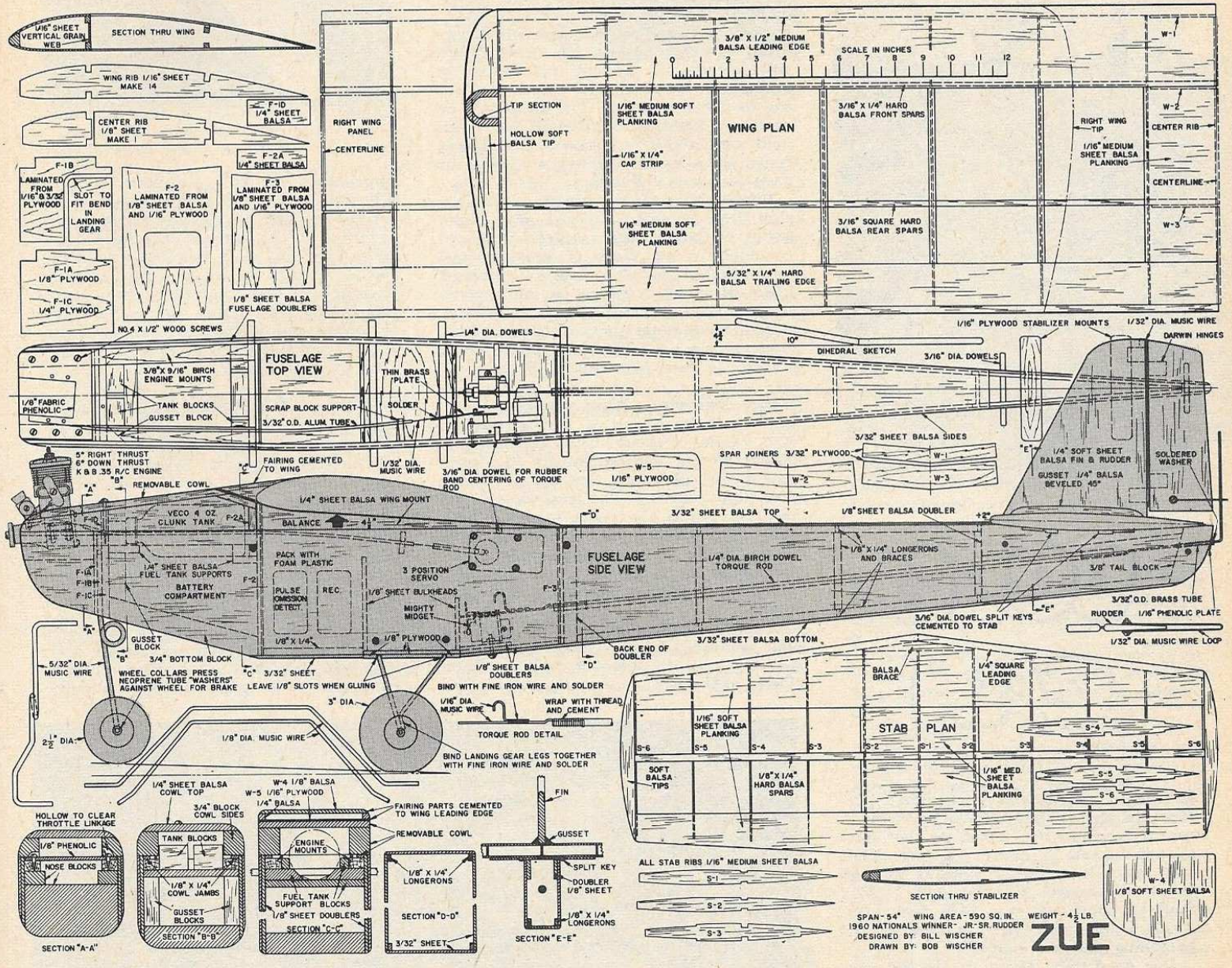
held down by wing mount rubbers at rear and one screw at front. Entire fuselage should be covered with silk for strength.

Cut 14 wing ribs from 1/16" medium balsa and one rib from 1/8" hard balsa. Spars should be the hardest balsa available. Note that top rear spar is set down 3/32" to prevent its touching the silk covering. Build the wing in two halves, one right and one left. Assemble ribs to bottom spars pinned to a flat board. 3/8" x 1/2" leading edge may be precut to a 27° angle on top and 15° on bottom. 5/32" x 1/4" trailing edge should be hard balsa cut to a 15° angle on top. Add top spars and leading edge to ribs. on flat board until cement dries. This insures against warps. Same treatment for second half. Cement trailing edge to rear edges of sheeting. Round off leading edge with sanding block. Sand wing lightly to level out uneven spots.

A fairing is required where the wing meets the top cowling. This is built up of 1/4" blocks, 1/8" sheet balsa, and 1/16" plywood, using fuselage for pattern to assure a snug fit with the cowl. Great care must be exercised throughout construction to avoid warps. Complete wing, covered and doped, should weigh less than 10 ounces.

The stabilizer is built up similar to the wing with 1/16" ribs, leading and silk with at least five coats of clear dope to keep castor oil from soaking thru. Color dope is used on the fuselage and for trim only. We agree that color dope makes a prettier model, less likely to fade or became oil soaked; but remember this is to be an expendable plane, built light for contest work. The weight of color will just take enough edge off your stunts to send the trophy home with the other guy.

Our control installation consists of a Kraft receiver used in conjunction with the Hrach pulse omission detector, (May 1959, *American Modeler*). These operate a Mighty Midget on the rudder and Cobb 3-position throttle servo. This



When thoroughly dry, wing panels may be lifted from board and joined at center for 5° dihedral with 3/32" plywood joiners. Use white glue under pressure with a row of spring type clothes pins for clamps. Make certain that the bottom surfaces of both panels are parallel. Add 1/16" medium soft balsa trailing edge and leading edge sheeting. Add center section sheeting and cap strips to ribs, using 1/16" medium balsa. Tack cement soft balsa tip blocks temporarily in place, then carve to shape and cut them off with a razor blade so that inside can be hollowed out. Cement in place permanently. Cement vertical grain 1/16" sheet web between front spars on one half of wing and weight this panel trailing edge sheeting of medium or soft balsa. 1/8" x 1/4" spars should be hard and leading edge 1/4" square medium balsa. Assemble ribs to spars, add leading edge, then cement 1/16" sheet on top, bottom, and center section. Fin and rudder are cut from 1/4" soft sheet balsa, then sanded to a streamline shape. Cement the fin in place on the stab center line. Gussets are carved from 1/4" square medium balsa and cemented along joint where fin meets stab for strength. For long life and free operation use metal hinges, such as Darwin or Perfect, making certain there is no binding.

Give all wood parts which come in contact with the silk covering three coats of clear dope. Covering should be colored servo requires the use of a double pole, 100 ohm relay in the P.O.D. obtainable from Lafayette Radio, stock No. RY-189, $3.70 (this is Potter and Brumfield type KM11D DPDT 12v. coil D.C.)

Torque rod to rudder should be 1/4" dia. birch dowel with 1/16" dia. music wire ends bound and glued in place. The throttle can be driven by a 1/32" dia. music wire push rod thru 3/32" O.D. tube. Our transmitter is a ground-based WAG single tone with tube type electronic pulser. The hand held control box has a 60 control pot which is heavily spring centered to give a good flight "feel". Push buttons are used to obtain full right, full left, and "solid" signal (or "off" signal) to operate the throttle.