SHOESTRING SLOW RAT RACER

By BILL MELTON . . . The author talks about slow rat, and then tells you how to built one that needs no excuses for its appearance!

The author and three of his Shoestring Slow Rats

• Our club, The Mesilla Valley Model Airplane Club, started flying slow rat race as a way of helping our junior members prepare for AYSC competition in the early 1960's. As some will remember, the AYSC competition was a quadrathon type of event in which one plane and engine combination competed for beauty, speed, stunt and endurance. We added other areas of competition, including combat, rat race, and balloon burst, to keep things interesting to everyone. Several quadrathon types of contests were held in this area within clubs and between clubs. During this same time, interest in rat race was high. However, by 1967-1968, speeds were around 130 mph and winning times were getting into the five minute bracket.

My rat race partner and I were driving home from a contest at Tucson, all beat and tired, and decided something had to be done to slow down rat race. We were getting too old to compete and only the rare juniors and newcomers to the sport could safely handle a good fast rat. This was the beginning in our area of slow rat race as an official contest event.

Our first contest to include slow rat race was held during the summer of 1968; and the results of our second contest were published in Flying Models, November, 1968 by the Tucson club. The winning time was 9:48.6 (I won!). Slow rat race had already replaced fast rat as the most popular event, and within a short time, fast rat was not included in most contests.

Our initial rules required a minimum of 300 square inches of wing area, 36 inch minimum wingspan, profile fuselage, 2 wheel conventional landing gear, 5 inches between the T.E. of the wing and the L.E. of the stab, .29 to .40 engines, 2 ounce tanks, no quick-fills, no pressure and no hot-gloves, and 140 lap races with no mandatory pit stops. Tank size was reduced to 1 ounce in 1974 in a further effort to control speed. These rules have persisted and worked well for nearly 10 years. Interest and competition has remained at a very high level. Race times are now in the low seven-minute bracket. Everyone can compete with a minimum of expense and with a plane they are capable of flying. Engine longevity is good, and when restricted for economy, the more expensive Schneurle engines have no, or very little, competitive advantage over the older, available, and cheaper cross-flow engines. The event, or at least similar events, is now very popular in Texas, New Mexico, Arizona, California, and Colorado. I am sure others are also enjoying slow rat race as a competitive event.

The Shoestring presented here has been flown for the last three contest seasons, and has consistently won or placed. Our low time with a one ounce tank, is seven minutes flat. This was accomplished with Blue Blazer fuel, K&B 40 FR, and 8 x 9 prop, running about 95 mph for 49 to 50 laps. It should be noted that the plane also meets the AMA slow rat race rules. An engine change, larger fuel tank, a bigger venturi, a fuel shut-off, and more nitro, and it will be competitive in this new event. I hope speeds will be reasonably slow, but I have my doubts. My guess is that the average winning times in AMA Slow Rat will be in the low 6's by the end of this first season and into the 5's within two years.

CONSTRUCTION

The first step in the construction is to cut plywood templates of the root and tip ribs. Make these about 3/16 inch longer than the actual size to allow for the system which generally results in shorter ribs than expected due to angles of sanding. Stack the templates so that the high points of the airfoil are the same and drill two holes near the leading and trailing edges. Form a "U" from 1/16 music wire to go through the holes to hold the group together. Sandwich the rib blanks between the templates and sand to shape. Check the ribs for length on the plans and adjust accordingly.

Notch the trailing edges of all ribs, except Numbers 1 and 2, so that the trailing edge planking is flush with the top of the rib surface. Do not shorten the rib during this step. Cut 1/16 inch from the upper and lower surfaces of ribs 1 and 2 so that the center planking will be flush with the rest of the ribs. Use the main ribs as a pattern to cut the half-ribs.

Cut the trailing edge planking to shape and mark the rib locations. Assembly starts by gluing the ribs onto the trailing edge and attaching the leading edge. The wing should be blocked up so that the center line of the leading and trailing edges are equal distances from the building surface at all points. Put on the top half of the trailing edge planking. The top spar is also installed with the wing blocked up. The spar should go on the high point of the airfoil. I usually pin the spar to the ribs, mark the location and then cut the notches to get the proper fit.

Turn the wing over, block it up again to insure straightness, and put in the other spar. The half-ribs and the web between the spars should be put in at this point.

The bellcrank platform is cut from plywood and epoxied to the leading edge and between the two center ribs. Note that the platform is below the center line of the wing. The bellcrank with leadouts and a stub pushrod are now installed. The pushrod exits through the center line of the trailing edge. A bearing is made from 3/16 O.D. brass tubing and epoxied in the trailing edge. Care should be taken in positioning the bellcrank so that the exit in the trailing edge and the eventual pushrod to the elevators will run parallel to the fuselage side.

Plank the wing center section. The tips are cut from 3/8 inch balsa and epoxied in place. The tip formers can also be installed at this point. The wing

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tip is sanded to shape, taking care that the wing is at least 1 inch thick within 2 inches of the tip. The leadout guides are of 1/8 O.D. brass tubing installed on the center line of the tip. Use about 1 ounce of tip weight. A little sanding, and the wing is finished.

Fuselage construction is typical of most profiles. The fuselage is cut from 1/2 inch C-grain balsa. The motor mounts are installed with epoxy. Before epoxying the 3/32 plywood doublers in place, excess epoxy should be sanded off with a block to insure a flat surface for engine mounting. Don't forget the hardwood insert for the landing gear mounting. After the doublers are attached, the fuselage can be sanded to an elliptical cross-section and narrowed aft of the stab mounting.

The stabilizer and elevators are cut from 3/16 inch balsa. I use quite hard balsa for the stabilizer, and softer balsa for the elevators, in the hopes of saving some weight. A large control horn is installed in the elevators with Epoxy-lite. Remember that the control horn is offset to the outside of the circle and is not in the middle. Pin type, nylon hinges are then installed in the elevators, making sure that the hinge line is straight with the center line of the control horn. The stab and elevators can now be assembled. Epoxy-lite is also used to install the hinges. Sand the stabilizer and elevators to shape after assembly.

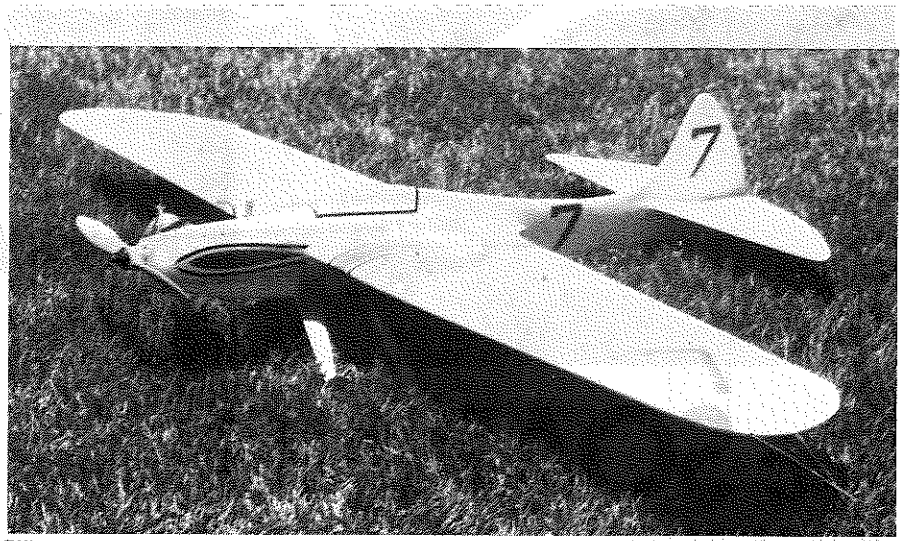
The rudder is cut from 3/16 inch C-grain balsa and sanded to shape.

All assembly of parts was done with Hobbypoxy II glue. The cheek cowl is cut from 1/2 inch balsa and epoxied in place after drilling for the motor mount holes and installing the blind nuts. All filleting was done with Epoxy-lite. The tail skid was also installed with Epoxy-lite. Sand the entire plane with 320 sandpaper and fill all nicks and scratches with Stuff. I paint the fuselage and tail section, and Monokote the wings.

The finishing procedure is dictated by the adhesive materials used in construction and goes something like this: 2 coats of Sig Lite-Coat, low-shrink dope sanded with 320 sandpaper, 3 to 4 coats of Sig sanding sealer sanded with 220, 320 and 400 sandpaper. Set the plane aside for about a week to allow all solvents to evaporate, and then spray with 2 coats of Super Poxy. Don't forget to mask off 1 to 2 inches of the center planking on the wing to have a place to stick the Monokote. To prepare for Monokote, just sand the bare wood with 400, blow off the dust and iron the film. A narrow strip of Monokote trim should be placed over the joint between the Monokote and the Super Poxy, to prevent fuel from entering this joint.

Final assembly is started by attaching the aluminum landing gear. The pushrod to the elevators is joined with a coupler. Leadouts are tied off according to AMA rules. The engine is installed, and then you are down to a critical area, especially if you are running the 1 ounce tank rules. You can build a tank as shown on the plans (from an old Veco square rat race tank) or buy one and modify it. The "must" requirements in a tank are that it holds 1 ounce of fuel, that it's of the uni-flow type, and that it has some kind of anti-siphon device. The one shown on the plans is made of square brass tubing and spring-loaded to open the overflow when depressed and to seal off the overflow when released. Others have accomplished the same thing by soldering an alligator clip onto their tank and running a surgical tubing overflow through the jaws. When running, the only tube open to the atmosphere should be the air-inlet tube (filler).

My choice of engine is the old, reliable K&B 40 FR with a 1/4 inch diameter venturi equipped with an O.S. 35 stunt needle valve assembly, a Rev-Up 8 x 9 prop, and Blue Blazer fuel. Other engines that have been effectively used in this area include the O.S. 40, HP 40, OPS 40 and the ST G21-40 FR. I feel the real challenge in this event revolves around the 1 ounce tank rule. This makes economy of primary importance and speed somewhat secondary, but leaves a lot of factors up to the imaginative modeler. Venturi size, shape and length, needle valve combinations, head shapes and compression ratios, glow plugs, fuels and fuel tank shapes, provide enough variables to keep anyone interested. Speed and economy are generally only mildly compatible, and you have the choice of going fast and pitting a lot or going somewhat slower and pitting less. I think this combination provides an excellent training ground for team-race, and also a relatively slow event for competition. ●



Bill says, "I like a semi-scale look without a loss of performance, and the Shoestring really does this." Certainly looks less "ratty" than some Rats we have seen!