Author brings Minnow by on low pass. Speed is needed, but reliability really pays off in QM competition; all heats must be finished. *Bill McCallister photo.*

Quarter Midget Racer

By GREG DOE

Quarter Midget scale version of famed LeVier Minnow. Top QM at 1974 Nats and runner-up in 1975; proof of model's performance potential.

• Certainly one of the most popular model racing designs is the Minnow. Actually, three nearly identical aircraft were built by LeVier and Associates in California around 1949: the Minnow, the Tony and the Ballerina, plus a fourth airplane of shoulder wing design, Miss Cosmic Wind. All four were of Cosmic Wind design, so to simplify things, this model will be called a Quarter Midget Minnow.

The accompanying pictures show the fifth Quarter Midget of this design. All flew very well with the exception of number four, which had poor performance in the air due to a warped wing. It did, however, perform well enough to win 1st place at the 1974 and 2nd place at the 1975 Lake Charles Nats in the hands of Tom Baker of Kings Mountain, North Carolina.

A dentist and father of five boys, Tom Baker, like many other modelers, is often too busy to do all the model building that he would like to do. This provided a situation

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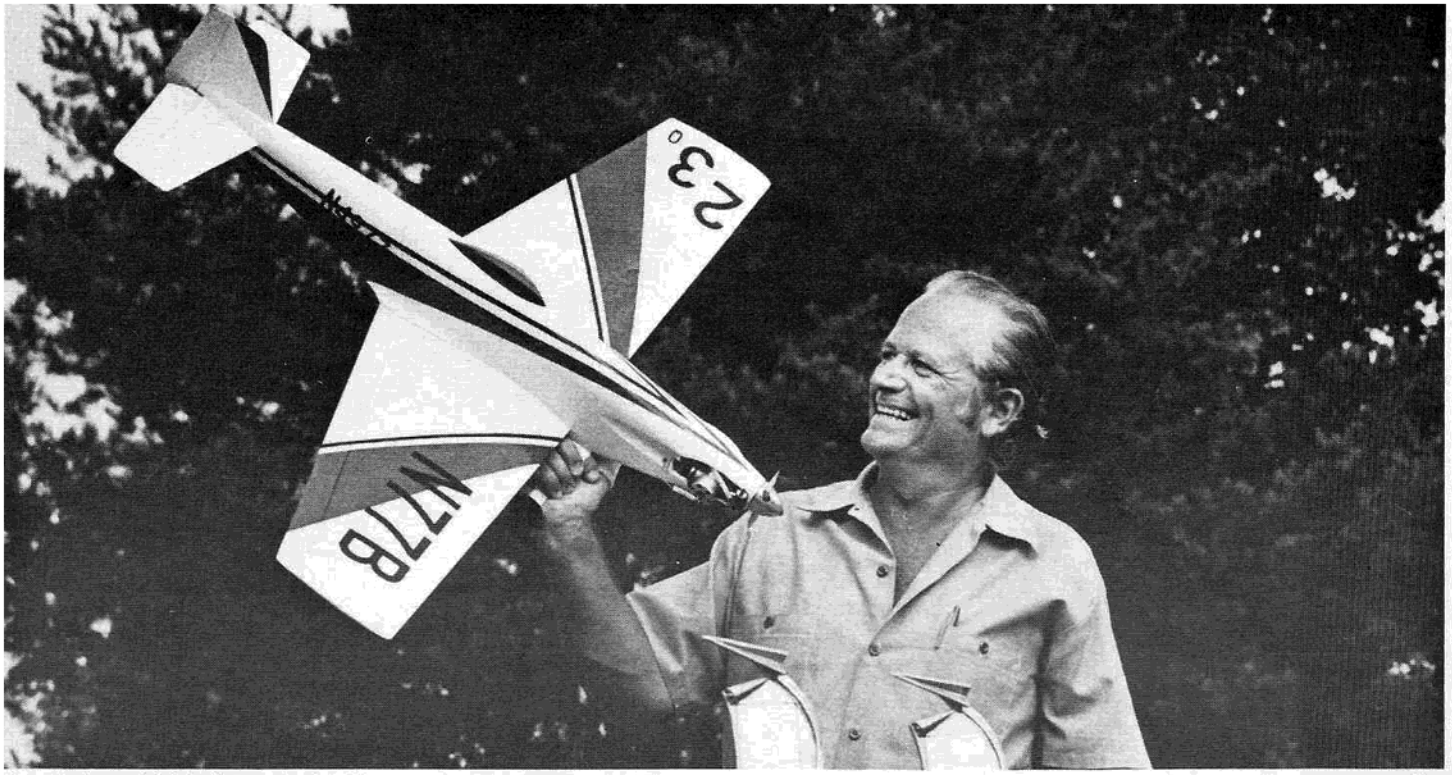
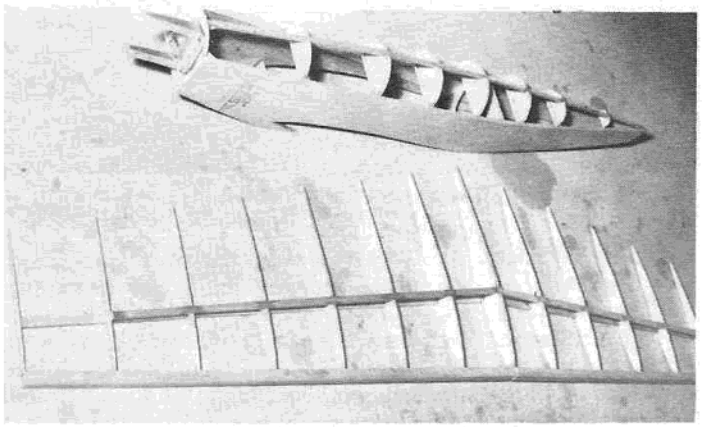
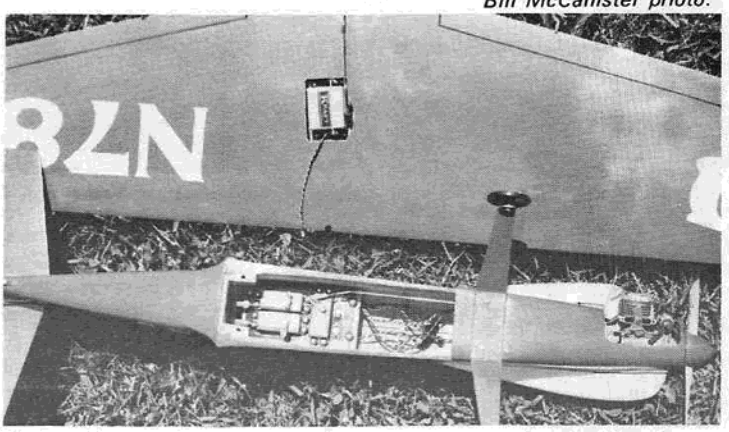
Photo really shows off Minnow's minimum frontal area; ST .51 handles power chores nicely. Snappy paint job is with K & B Super Poxy.



Tom Baker with his Nats winning Minnow powered by Rossi .15. Ship weighed 2 lbs., 12½ oz., but it still was light enough to place well. *Bill McCallister photo.*



asic construction is simple; wing is very fragile sans sheeting.



Plenty of room for miniature servo types; note the single aileron.

QUARTER MIDGET MINNOW . . . CONTINUED

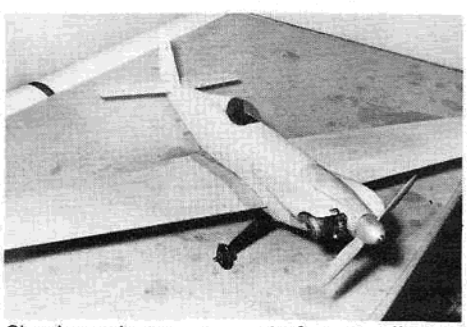
beneficial to both of us; I built Tommy a Quarter Midget Minnow in exchange for a customizing job on a Formula One engine.

The 1974 Nats winning plane was powered by a Supertigre .15 and equipped with a Kraft radio using KPS 12 servos. Weight was 2 lbs., 8½ oz. Tommy chose to replace the cheek cowls and canopy with more streamlined ones of his own design; performance seemed unchanged.

For the 1975 Nats the airplane sported a new red and white paint scheme, a Rossi .15 and glow heat. The glow heat consisted of a 550 MA nickel cadmium battery in the airplane and connected to the glow plug for each heat race. The primary purpose of the glow heat was to produce a more reliable idle. To my knowledge, only two 1975 Nats contestants used glow heat, Tom Baker and myself, and we finished 2nd and 5th. Flying weight of the Minnow was raised about 4 oz. with the new paint scheme and the airborne glow heat battery.

Before beginning construction, study the plans and text carefully. Certain construction techniques employed may be too difficult for the inexperienced builder. If you have never built a Quarter Midget, select one of the many fine kits for your first attempt.

Before a description of the construction, a comment on adhesives. If you have not used any of the Alpha cyanoacrylate glues, you must drop everything now and try them. They're the neatest thing since sliced bread. Two well-known brands are Hot Stuff and Aron Alpha. About 80% of the construction of this model was done with Alpha glue. This glue is not a void filler; parts must fit closely. Once you have experimented with this glue on several models, you will appreciate its many uses. (If Alpha glue is not available locally, it may be ordered from FHS Supply, 645-D Pressley Rd., Charlotte, North Carolina, 28210. Ask for Aron Alpha and send $5.00 to cover cost, tax, postage, and handling.)



Cheek cowls are not on shaft center line, so 12° cant needed to line cylinder up with cowl.

The wing is fully symmetrical so that it may be built right side up or upside down. Determination of which side is to be top or bottom may be reserved until the panels are joined with the dihedral. The dihedral is 1-⅜" per panel or 2-¾" total.

Only one aileron is used. The aerodynamic reaction of adverse yaw dictates that if the airplane is turning left, the right aileron will help slightly to hold the

(Continued on page 64)

nose up in the turn. So much for theory. This design has been flown successfully with a single aileron on the left and on the right sides with no noticeable change in flight characteristics.

Begin construction with the wing, taking note that there are several things different about the construction. Spruce spars are recommended; however balsa has been used without failure. Two strips of ¼" x ⅛" x 36" spar material are all that is required. Only the bottom spar extends all the way to the tip of the wing. The top spar extends only to the edge of rib No. 7. Rib No. 8 is butt glued to the end of the bottom spar. Rib No. 7 is notched on the bottom side only to accept the spar. The top spar will butt glue to the side of rib No. 7. A piece of trailing edge stock slid under the ribs at the trailing edge will help keep the ribs aligned during construction and can also be used to introduce washout in the tips, if desired.

I chose not to washout the tips on my planes. The leading edge is notched 3/16" deep, and a strip of 1/64" plywood is glued in the slot. This may be done with a Dremel rotary saw or similar tool installed in a drill press. The leading edge is sanded sharp right up to the plywood and has a radius of only 1/16".

The procedure I follow for building the wing is as follows: pin down the bottom spar; glue the ribs to the spar, supporting them at the rear with a piece of trailing edge stock; glue on the top spar; remove the wing from the building board and install the leading edge; sheet the wing and glue on the trailing edge and tips; sand and shape the wing panels and glue together with 2-¾" total dihedral; cut out the aileron and install the torque tube and wire horn; fiberglass the center section. Be aware that the wing is very fragile with only the spars and leading edge holding it together. It is also very prone to warp, so exercise caution while building and sheeting the wing, and check it often for warps.

The wing is located in the fuselage by way of a ¼" notch in the leading edge at the center section. This notch keys with a piece of ¼" square spruce glued vertically to the plywood fuselage Former B.

The fuselage sides are made of 5/32" sheet balsa. This thickness of wood might not be readily available, but it can be ordered from Sig, or you may substitute ⅛" sheet. The first four of these Minnows were built with ⅛" sheet sides. Also, all fuselage formers are of sufficient width to make a fuselage wide enough to be legal if ⅛" sheet is used.

After deciding what material to use for the fuselage sides, laminate the 1/64" plywood fuselage doublers to the sides, preferably with polyester resin, and glue the triangular stock to the back bottom of the fuselage sides. Cut out all fuselage formers from the scraps left over from the fuselage sides. If you do not use 5/32" sheet for the sides, make the formers out of ¼" sheet. Glue reinforcing strips across the top and bottom of Former F.

Assemble the fuselage as follows: Join the sides with the 3/16" cross brace at the location of Former A, Former B, and Former F; install the firewall and draw the tail together; install Formers A through I and the stringer across the top of the fuselage; install the tail skid plywood plate, and sheet the fuselage top and bottom. The top is sheeted in three pieces and can be done with either 1/16" or 3/32" sheet. Both have been used on different models.

The three pieces of sheeting are cut as follows: one piece extends from the firewall to Former C; the second piece extends from Former C to Former E; and the last piece extends from Former E to the tail. Glue on the landing gear platform and reinforce all corners with spruce or hardwood gussets. Glue the ¼" square spruce wing locating key vertically in the middle of Former B. Install wing-hold down blocks and fit the wing to the fuselage.

Make the wing fillets. Cut out the stab and vertical fin and install. The rudder is inset through the top sheeting and is glued to the fuselage stringer. After the fuselage has been sheeted, Formers A through E must be cut away to make room for the radio installation and fuel tank. Cut away most of the formers but leave a ring about 3/16" thick for strength.

How the nose is built will be determined by the engine and motor mount used; therefore no description will be given on how to assemble it. It is suggested that the engine be side-mounted and that the cylinder be angled down about 12° from horizontal. Build the nose up from block balsa and sand it to shape. Fiberglass the nose back to about 1" behind the firewall.

The cheek cowls were vacuum-formed from styrene plastic, but they could easily be carved from block balsa. The canopy is cut from a Sig 7" canopy, and the fairing behind the canopy is block balsa.

If a suitable commercial landing gear is unavailable, use the template on the plans to make one.

Use your favorite finishing technique, either paint or plastic film, but keep it light. The finish on the model shown here is much fancier and heavier than I normally apply to my Quarter Midget racers. It consisted of one coat of thinned polyester resin, Japanese tissue applied with nitrate dope, two coats of Super Poxy primer and, finally, colored Super Poxy paint. The airplane weighs 2 lbs., 7½ oz. with four Kraft KPS 14 servos and the small (450 mil) battery pack.

The center of gravity shown on the plans is only an approximate range, and performance may increase or decrease by adjusting the center of gravity ahead of or behind that shown on the plans. The fuselage servos should be mounted as far back as possible. The battery pack may be shifted from under the fuel tank to in front of the servos to adjust the CG. It is suggested that the aileron servo be side-mounted to give more clearance between the servos in the fuselage and the aileron servo. Limit the elevator throw to ¼" up and down for the initial test flights. Aileron throw is also set at ¼", which may seem like a lot, but with only one aileron this much travel is necessary.

If the airplane is built straight and balanced properly, you should have no problems flying your Quarter Midget Minnow. Hope to see you at the next race—and remember, support NMPRA. Their only interest is to promote all racing. ■