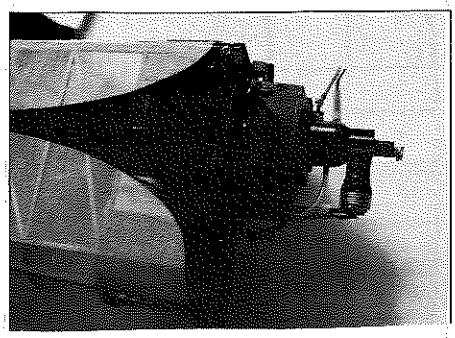
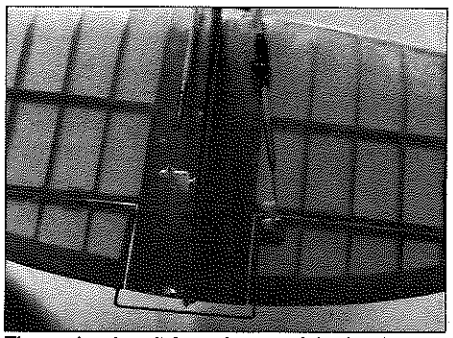
The HORNET

BY NORM ROSENSTOCK





The pushrods exit from the top of the fuselage just forward of the stab. The author used 1/8-inch wood dowels for the pushrods; a pull-pull cable system could also be used and would weigh almost nothing. Note that the author's model has two elevators, whereas the plan shows only one. One will do the job just fine, why make more work for yourself?

Since relocating to the sunny state of Florida, I have returned to my modeling roots. I discovered free flight rubber once more, and although a joy to build and fly, I find that at my age chasing models across hill and dale is a bit of a problem. At the local field many of my contemporaries are building free flight gas and rubber and are using trail bikes to chase the models. While that is one solution, it is not *m* solution. I don't care to be riding a bike or for that matter owning one.

The return to this facet of modeling is in part due to my friendship with Dave Platt. We met at the '88 Nats and he invited me to join him in a flying session. At the present time he is into free flight and rubber modeling. He sponsored the "Dick Korda 50th Anniversary Meet" on August 6, 1989, here in Florida, and encouraged me to build a Korda and compete. I did build the model and flew it in the meet. It was fun to go back to rubber again after fifty years, but I was not crazy about the chase.

One day while I was visiting Dave I saw a new model that he was building. It was a 1/2A Texaco RC model. The local SAM (Society of Antique Modelers) chapter was having a meet in a couple of months and 1/2A Texaco was one of the events. I had a 1/2A Texaco model that I had built years ago for sport flying, and considered using that model, but opted to build a new craft for this meet.

What model to build was the question. While looking through some old magazines one day I spied an article by Sal Taibi that caught my interest. It was about his Forster .99 powered "Hornet." I remember back in 1939-40 seeing him fly that model and it was spectacular. Well, that settled it. I scaled it down for the 1/2A Texaco event.

PREFACE

a) The original model had an 88-inch span.

b) It was powered by a large (.99 cubic inch) engine.

c) The model had a *very short* nose moment.

This 1/2A model has a 44-inch span and has 350 square inches of wing area. According to the SAM rules it must weigh at least 19-1/2 ounces, and be powered by a reed-valve .049 Cox engine.

Due to its short nose moment it is most important to keep the aft portion of the plane *light*. Otherwise you will have to resort to nose ballast to achieve proper balance. This will increase its weight, making it a non-competitive machine. Remember, in competition, "lightness is king."

CONSTRUCTION

Start construction by making tracing paper copies of the parts that have to be cut out. I generally use a 3M or similar spray adhesive to glue the templates to the wood, and then cut out all parts beforehand, in effect making myself a kit. Note: Use contest grade balsa or 6-8 pound balsa stock.

FUSELAGE

I still use wax paper on the plans when building the side frames. When the first side is done, build the second side on top of the first, in the traditional manner. I generally cut some wax paper into one inch squares and place them at the gluing points to prevent the two sides from sticking together.

Assemble the two sides in the usual manner, using the top view as a guide. Form the rear skids and ply mount and glue it in place between the lower longerons. Install the firewall, the bottom formers, and stringers.

Next, form the front landing gear, install the wheel, and locate its position on the firewall. Using some thin CA, spot glue it into place. Take some hardwood (spruce, maple, etc.) 1/4-inch square about 4 inches long, and with a hacksaw cut a groove about a 1/16-inch deep. Cut two from this about 1-1/2 inches long and using thick CA glue, cement them over the wire to capture it. Glue the remaining piece over the horizontal portion of the wire to complete the landing gear installation.

The next item is the engine box mount. The engine used is the Cox .049 Black Widow or the Cox .049 Texaco engine. Build the box mount from 1/8 sheet balsa as indicated on the drawings. Take note of the 2 degrees downthrust. (An option is to also include 2 degrees right thrust.) After forming the mount, fasten the engine to it but *do not* glue the mount to the firewall yet.

The cowling is the easiest part. Cut the parts out as shown on the plan and glue them together. Before carving, view the block from the same angle as shown on the plans. That is, the side view should be the same on the block as the drawing, and the top view should look the same as that view on the drawing. Then I use an X-Acto long

whittling blade to carve the block to its rough shape. I use #50 grit sandpaper on a block to further shape the cowl. Start using finer and finer sandpaper to give the cowl its final shape. The whole carving and sanding job should take about twenty to thirty minutes.

When the outside of the cowl is done, give it a couple of coats of dope to toughen up the surface before doing the inside. If you have the right tools, the inside is a snap. Years ago (1950) we used to do a lot of carving on our models, so I went into a hardware store and bought myself a good 3/4-inch gouge (a U-shaped chisel) and it has been steadily employed these forty years.

The drawing shows the Cox engine in the inverted position. I had some difficulty with running and starting the engine in this position. If I had it to do over, I think I would install it upright. In any event, it is necessary to make a needle valve extension. After sanding the black paint off the needle valve top, solder a piece of .040 music wire to the top.

Have someone hold the fuselage in a vertical position and set the engine with its box mount in position on the firewall, then slip the cowl into position over the engine. Grab the end of the prop shaft and move the engine around until the box is seated squarely on the firewall and the shaft at the front of the cowl is centered. When you are satisfied with the position of the assembly, carefully lift off the cowl and, using some thin CA, wick it all the way around the box/firewall junction. Once the glue has set, you can give it a couple of thin coats of thick CA to increase its bond.

If you decide to install the Cox engine inverted, you will need to make an opening in the front of the cowl to let the cooling air in, and install an exhaust vent on the side of the cowl at the parting line. It should be at least twice as large as the inlet.

You can use any method you want to hold the cowl in place. I just bent up a few straight pins as hooks and stuck them on the finished cowl just in front of the wing hold-down dowels, and one at the bottom near the landing gear, and used small rubber bands to secure the cowl in place.

TAIL

The rudder is very straightforward and really needs no explanation. The stab, however, does. Cut the spar to length and then taper it as shown on the plan. Lay out the outline of the stab on the plan, then fill in the "ribs" using 1/16x1/2-inch balsa, the exception being the two center ribs which are 1/8x1/2-inch. After the glue has set, remove the structure from the plan and, using a small razor plane, roughly shape the ribs to an airfoil shape, and finish off with some sandpaper.

Lay the stab back on the plan and mark off where the elevator is cut. The plan shows only one elevator; my original model had two. I coupled them by making a U-shaped wire frame attached to the trailing edge of my elevators. For hinges I used Sig's "Easy Hinges," cutting them in half.

WING

Build all four panels first, leaving out the ribs at the dihedral breaks. Start by joining a center panel and its tip panel. Lay the center panel on the table and weight it down with some old magazines to hold it in place. Then take the tip panel and pin a piece of scrap balsa to the tip to prop it up two inches. Sand the spar stubs and the leading and trailing edges until you get all of them to match. Use a drop of glue to tack them together. Cut eight pieces of .007 CF (carbon fiber) to 1/4x1-inch long and glue these across the joint of each individual spar on both sides of each spar. Use thick CA to glue them in place. After the glue has set, trim away the excess CF, and after widening the spar notches in the ribs, glue them in place. If you do not wish to use CF, 1/32 ply can be used as a substitute. Join the remaining two panels as you did the first two.

Take the two wing halves, lay them on the bench, and prop up each half one inch as measured at the dihedral break. As before, match up the ends and join with CF. Install your center rib. Your wing is now ready for sanding.

COVERING

Covering on such a small model can make the difference between a competitive model and a sport model. As I said before, in competition, "lightness is king." If you are building this model for sport, a heat-shrink film such as MonoKote is good enough. However, if you wish to build a competitive machine, you must use Japanese tissue, or as I did, cover with Coverite's Micafilm. Japanese tissue is lighter (with minimum dope) but is much more fragile. Micafilm is only slightly heavier but is tough to tear and requires no dope. "You pays yer money and you takes yer choice."

R/C INSTALLATION

1. Use the lightest receiver that you can get your hands on. My four channel receiver only weighs one ounce.

2. Use the lightest servos that you can get. I am using Aristo-Craft's Miniservo #AR103100s which weigh .65 ounces each.

3. Use the lightest batteries you can get. I had three receiver battery packs in my battery drawer. I weighed each one. Here are the results:

a. 500mAH = 100 grams (3.5 ounces).
b. 270mAH = 61 grams (2.2 ounces).
c) 150mAH = 40 grams (1.3 ounces).

I used the 150s for my installation. First, they are the lightest. Second, they have enough power to give me at least four 15-minute flights, so why carry more weight? The only logical reason to use a heavier battery is if your plane is underweight.

You will notice from the drawings that all the R/C equipment is mounted against the firewall in tiers. The battery is on the bottom with a 1/8 sheet partition above it to contain it. Above it are the two servos; each one mounted to the 1/8 side walls with double-sided tape. Above the servos is another partition. This partition, however, is removable. I glued two 1/8 squares to each side wall, spaced for the 1/8 sheet floor. This floor is able to slide out rearward. It holds the receiver, which is mounted to the floor with double-sided tape. The reason for having this floor slide out is to permit access to the servos below for whatever adjustments they might require. I made the pushrods out of 1/8-inch diameter birch dowels, but any material (such as balsa) can be used as long as it's light.

Control surface movements are:

a. Rudder: 1 inch right and left.
b) Stabilizer: 3/8-inch up and down.

FLYING

When the model is completed, assemble the model and check the balance. It should be as indicated on the plan. If it is tail-heavy then you must install ballast (in the inside of the cowl as far forward as possible) until the model balances level at the specified location. If you have done a good job of keeping the tail light and the model balances nose-heavy, then move the receiver battery rearward until balance is achieved.

Having satisfied that requirement, you can now proceed to the next step, *hand gliding* (a lost art). Most local modelers who fly R/C almost fainted when they saw me hand gliding my model. "It's just not done anymore." The only ones who still do hand gliding, it seems, are the glider fliers. Find yourself a grassy flat open field, preferably a field that does not contain any rocks or other debris. Turn the radio on and check the controls for function. Set the trims to give neutral position on both surfaces. With the transmitter in one hand, grab the model with the other hand, holding the fuselage under the wing, and start trotting into the wind, holding the model in flight attitude. See if the model starts to feel light in your hand. At that point thrust the model forward with a gentle shove, aiming it at a point on the ground about twenty feet in front of you. If you are lucky and all was true and balanced the model should glide nicely until it touches down. If it does not, make the appropriate adjustments to your trim levers until you get that great glide.

Before making that first powered flight, note the amount of off-center trim. Readjust the control linkage so that the control surfaces are in the same position when the trim levers are in neutral. At this point you can fill the tank, start the engine, and after checking the controls for function, launch the model. If the engine is running well the plane should start climbing slowly but steadily.

With a well broken-in engine and a Cox gray 7x3.5 prop you should get a motor run of about five minutes on the 8cc tank. If the model is much heavier than the 19.5 ounces required, you may find that the climb suffers. If this is the case change to a 6x3 nylon prop. This will permit the engine to rev more and will improve the climb, but at a price. With the 6x3 prop you may not get any more engine run than 3-4 minutes. When the engine quits, the model should be a mere speck in the sky. From that point it's up to you to find the thermals. With any luck, the maximum time of 15 minutes should not be that hard to do. Have fun! **MB**