

By Richard Metlen

It never ceases to amaze me, how a small event will mushroom into a project that will take months to complete. On one lazy Saturday (I do most of my flying on Sunday afternoons), I was propped up in one of my favorite positions, looking between my shoes at the television set, watching an English World War II movie. The story line concerned an underground German factory that had to be destroyed, and every attempt that had been made, failed because of its access. The final solution to the problem was to fly some fast and very maneuverable bombers between the cliffs guarding the factory, and bomb the wall of the stone cliff above the factory, thereby effectively burying it.

The plane they used was the DeHavilland Mosquito MK IV Bomber. I was really fascinated by the plane. It was apparently highly maneuverable (although that could have been camera technique), fast, and they kept referring to it as the "Wooden Wonder." After enjoying the movie, the thought of the plane wouldn't leave me, so I proceeded to get some more information on it and, besides, whoever heard of a wooden WW II aircraft?

Like the history of many of our best planes, the P-38 and the B-17 among them, the Mosquito had a tough start. The concept of a bomber that carried no defensive weapons, but relied on its speed as a defensive weapon (and made of wood in an age of aluminum) didn't sit very well with the British Air Ministry. The factors that saved the plane was the sure shortage of aluminum that would be experienced in a war, the use of existing furniture manufacturing shops where it could be built, and the success that the DeHavilland Company had experienced with wooden planes in the previous decade.

All arguments and doubts came to an end, when the "Wooden Wonder" showed its capabilities. With a top speed of 380 mph, a cruise speed of 265 mph, a ceiling of 34,000 feet, and a range of over 2,000 miles while carrying a bomb load of 2,000 pounds, the Mosquito became one of the outstanding aircraft of the war. This information really wetted my appetite.

I had two Enya .40 engines sitting in my "Clipped Wing P-38" (a long story all by itself), and if the wing span of the Mosquito was set at about 65" and I could keep the wing loading at a reasonable figure, I could have a very exciting model.

## DeHAVILLAND MOSQUITO BOMBER MK IV SERIES II Designed By : Richard Metlen

### TYPE AIRCRAFT

Stand-Off Scale

### WINGSPAN

66 1/2 Inches

### WING CHORD

16" at Root

### TOTAL WING AREA

650 Sq. In. (approx.)

### WING LOCATION

Mid-Wing

### AIRFOIL

Symmetrical

### WING PLANFORM

Double Taper

### DIHEDRAL, EACH TIP

1 3/4 Inches

### O.A. FUSELAGE LENGTH

49 1/2 Inches

### RADIO COMPARTMENT AREA

(L.) 11 1/2" X (W) 3 1/2" X (H) 3"

### STABILIZER SPAN

25 Inches

### STABILIZER CHORD (incl. elev.)

5 1/2" (Avg.)

### STABILIZER AREA

175 Square Inches

### STAB AIRFOIL SECTION

Symmetrical

### STABILIZER LOCATION

Mid-Fuselage

### VERTICAL FIN HEIGHT

8 1/2 Inches

### VERTICAL FIN WIDTH (incl. rudder)

5" (Avg.)

### REC. ENGINE SIZE

(2) 40 Cu. In.

### FUEL TANK SIZE

(2) 8 Ounce

### LANDING GEAR

Conventional

### REC. NO. OF CHANNELS

5

### CONTROL FUNCTIONS

Rud., Elev., Ail, Throt., Flaps

### BASIC MATERIALS USED IN CONSTRUCTION

Fuselage ..... Polyurethane Foam & Ply  
Wing ..... Balsa, Ply. & Hardwood  
Empennage ..... Balsa  
Weight Ready-To-Fly ..... 144-160 Ounces  
Wing Loading ..... 31-35 Oz./Sq. Ft.

The next step was to purchase a plastic model of the Mosquito and start drawing plans. Fortunately, Revell had such a model in its catalogue. Unfortunately, Revell is no longer manufacturing the kit in the United States. Fortunately, my younger brother is the Executive Vice President of Revell, so I called him, apologized for the time when he was three years old and I told him the can of Boraxo was the can of tooth powder, and requested his help in locating a kit. He really came through, and the next day I was in possession of a very dusty, but complete Mosquito kit. The story of his foray into the kit morgue will most certainly be told at office Christmas parties for years to come.

About the same time, I became acquainted with a material called polyurethane foam, and I was using it to make and repair wing tips. I seem to be able to damage wing tips even on a high wing plane with a trike gear. Polyurethane has several real advantages over the polystyrene foam that we have become used to. Since the polyurethane foam has no texture, it is very easy to sand and cut. I have used everything from a jig saw to a bread knife on it and it doesn't rip, gouge or tear. I use coarse garnet sandpaper to get the bulk down and the results look as smooth as if I used fine sandpaper on it.

Another nice feature is that unlike polystyrene, any glue adhesive, or resin, can be used on it and the foam is not affected. As if this isn't enough to have you running out to get it, it's also fuel proof, and is about three times lighter than balsa blocks. The material I used is rated at two pounds per cubic foot.

Need more? How about low cost. A 2' x 4' x 2" slab is less than \$10.00, and is sufficient for the

entire project. If the polyurethane foam is not available in your area, you can order it C.O.D. from Hastings Plastics, 1704 Colorado Ave., Santa Monica, Calif. 90404, attention Mr. Tolliver.

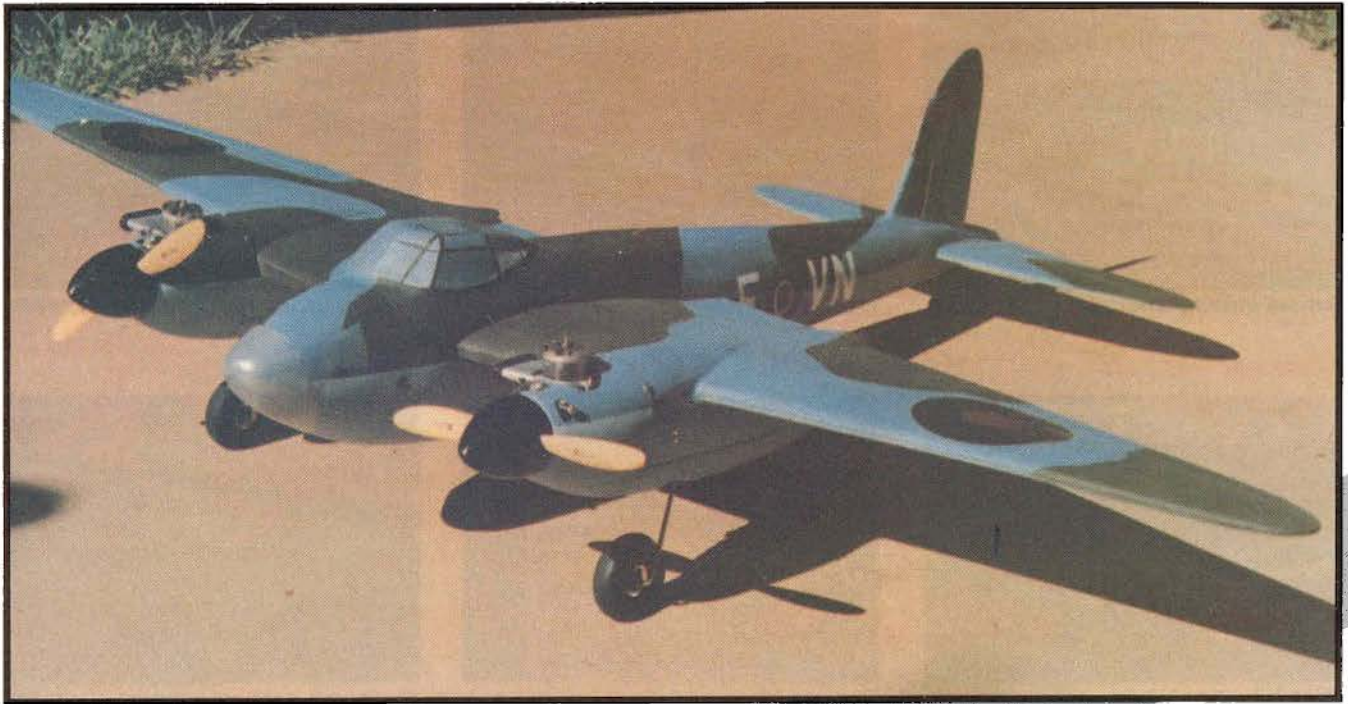
The thought struck me that with the use of Sig Ply-lite, and the polyurethane foam, the entire fuselage could be built for less than \$8.00, and we are talking about a fuselage that has a length in excess of 49" and is as much as 6" wide in some places. The construction time would also be dramatically reduced, because of the ease of handling the foam.

Since you probably have not used polyurethane foam before, let me take a few minutes to describe how it handles, and some do's and don'ts.

The foam has no texture. This means

If you've been afraid of scale --- particularly multi-engine scale designs --- the DeHavilland Mosquito MK IV Bomber is what you've been waiting for. Combining all the assets of the full-scale aircraft in speed and maneuverability, it can easily be trimmed to be as docile as a low wing trainer.

# De HAVILLAND MOSQUITO



that the finished product will be just as smooth if you use coarse garnet sandpaper or fine finishing sandpaper on it. The difference of sandpaper grit is the speed at which the material is reduced to the desired shape. I found the best way to handle the blocks of

greater detail later. After the glass

with the wing.

## CONSTRUCTION

# MK IV BOMBER

is to take the majority of material off with a knife, use coarse garnet to get you almost where you want to be, and finish with 100 grit sandpaper. You have to be very careful not to over-finish the foam. The material reduces very easily and it's very easy to take off too much and a mess to add contour back on.

Try to approximate where the finished blocks will be (after sanding) when gluing the foam blocks together, and do not go beyond that area with the glue. If you do, you will notice that the foam will sand away leaving the glue flash behind. This glue flash cannot be sanded away without further reducing the foam (the foam being so much softer), and you will have to get rid of it with cuticle scissors, which is a time consuming job and gives disappointing results.

The foam is fairly easy to dent before the glass cloth and finishing resin are applied so be careful where you lay it and how you handle it.

Two ounce glass cloth is needed to give the foam a durable finish. The 2 ounce cloth is used throughout the model except on the cowls and tank access hatch areas where 8 ounce cloth will be used, and will be described in

resin has set, don't oversand. If the cloth is cut through in sanding, you will have an area that will finish poorly and dent easily. If this happens, re-glass the foam, but watch the weight.

The foam must be glassed before trying to fill any areas with micro-balloons and resin, otherwise you will be trying to sand smooth an area which consists of soft foam and hardened filler. The only thing that will sand, of course, is the soft foam that hasn't been glassed.

As stated previously, the foam reduces very quickly and you soon find yourself in a cloud of green dust. To protect your marriage and home-life, I would recommend sanding outside, preferably on the grass. That way there is no clean up, lots of fresh air, and the color of the foam is just about the color of the grass, and doesn't show. As far as I could find out, the foam is non-toxic (my dog ate a piece before I could stop her and liked it better than her canned food), but with the smog and cigar smoke that I already am pumping in and out of my lungs, I figured I didn't need to add polyurethane foam dust, so I used a cloth wrapped around my face covering my nose and mouth when doing large areas where a lot of dust will be generated. Try to be as inconspicuous as possible. It really shakes up the neighbors to see someone with a mask on prowling around.

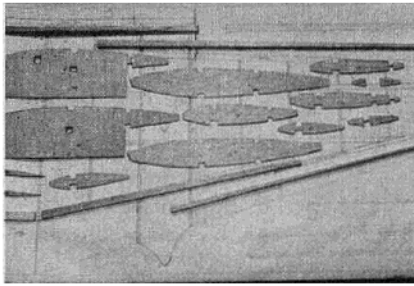
If all of the above admonitions haven't scared you off, let's start construction

Wing: Since the wing is rather straightforward, I won't dwell on it very much in this article, but I will just try to detail some of its problem areas.

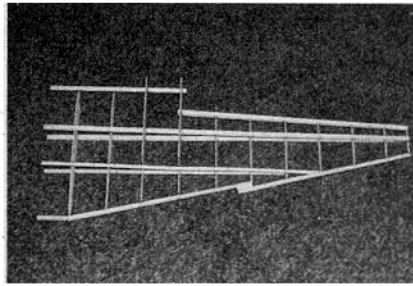
The wing must be constructed upside down (sorry about that) to accommodate the plywood sections that make up the nacelles. The two sections of the wing must also be constructed separately and, when completed, joined with the proper dihedral.

Since the wing tapers from a root of 2" thickness (W1) to a thickness of 1/2" at the tip rib (W11), the top 3/8" x 1/4" spar is blocked up 3/4" at W11, and pinned to the plans at the center section. Ribs W1, 2, 5, 6, 7, 8, 9 and 10, are cemented to the top spar so that they follow the line of the plan, and are perpendicular to the work bench, not to the top spar. The bottom 3/8" x 1/4" spar is slid through the slots in the plywood ribs W3 and W4 and this assembly is cemented to the top spar. At the spot where the two sections of W11 will be, the two spars are cemented together, and then W11 is placed.

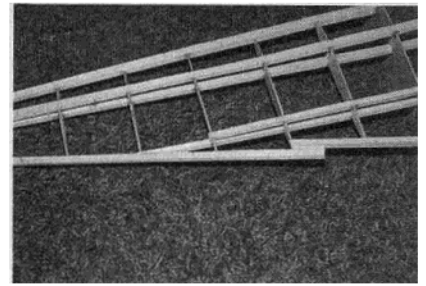
The leading and trailing edges are now cemented into position and, when dry, the scrap filler at W6 and the bottom 1/4" x 1/4" spar is cemented. The top spar is cemented when everything is dry and the wing is lifted from the plans. Note that the bottom 1/4" x 1/4" spar ends at W8, but that the top 1/4" x 1/4" spar ends at W7. Even at that, the bottom 1/4" x 1/4" spar will have to be tapered and shaped between W7 and W8 to allow for proper contour of the top and bottom 3/32" sheeting.



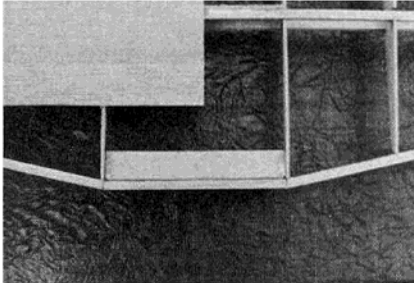
*Cut out wing parts.*



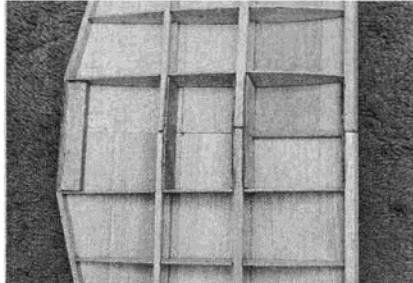
*Framed up wing.*



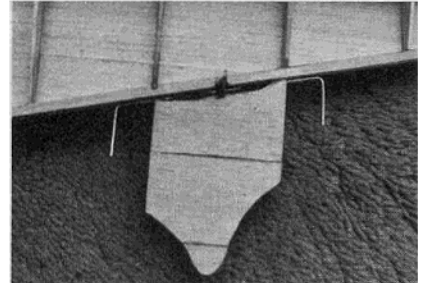
*Detail of 1/4" sq. spar between W7 and W8.*



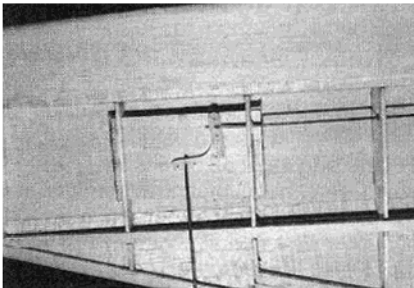
*Wing mounting block.*



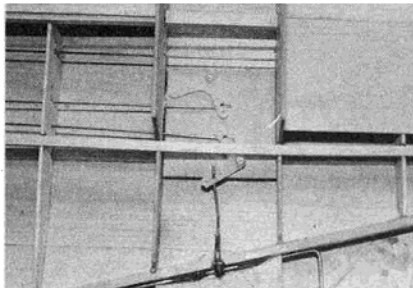
*Plywood braces and top sheeting.*



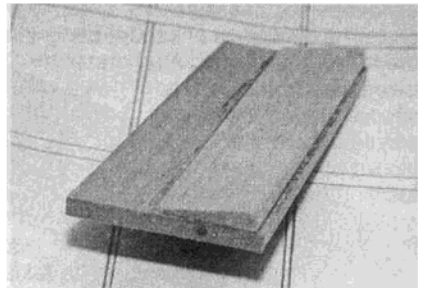
*Stationary section between flaps and control horn.*



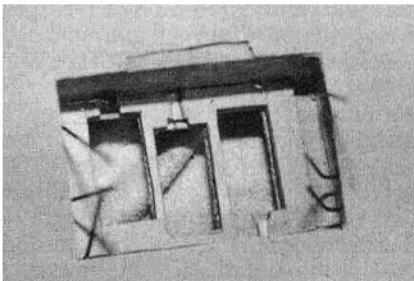
*Aileron bellcrank and pushrods.*



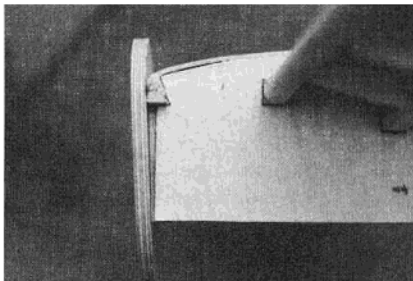
*Flap and motor bellcranks.*



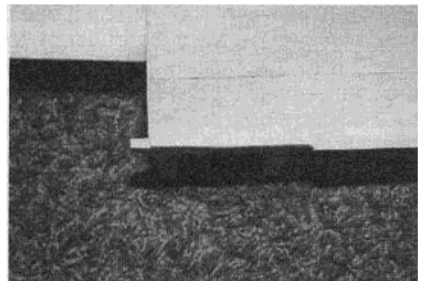
*Flap construction.*



*Servo area in wing for flap, aileron, motor – 1/4" plywood is used for the servo tray and the cases of the servo's extend through the top of the wing.*



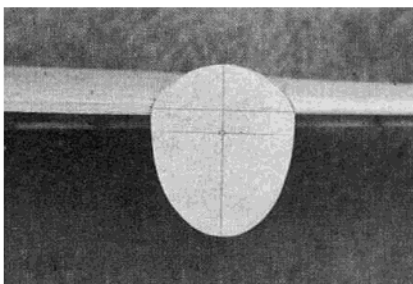
*3° down thrust.*



*Leading edge reduction for FW1*



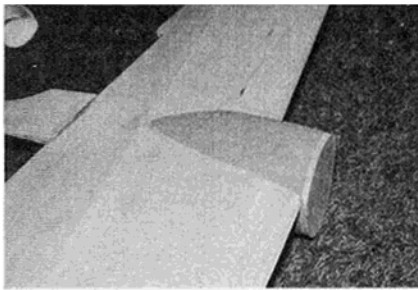
*3/8" sq. motor mount stock.*



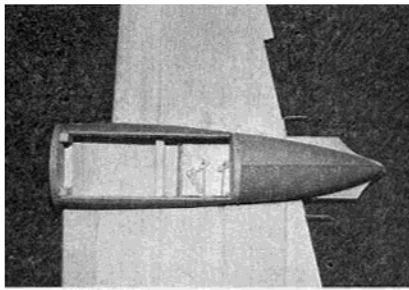
*FW1 alignment to leading edge.*



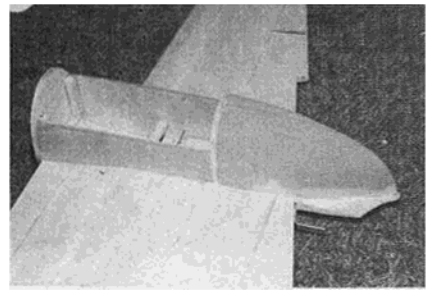
*Sandpaper to contour foam to top of wing.*



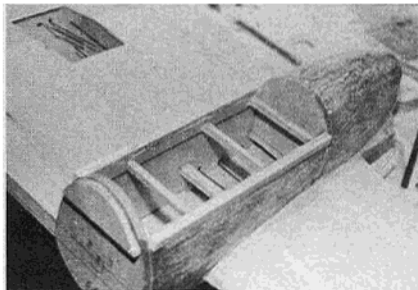
**Foam contoured and cemented.**



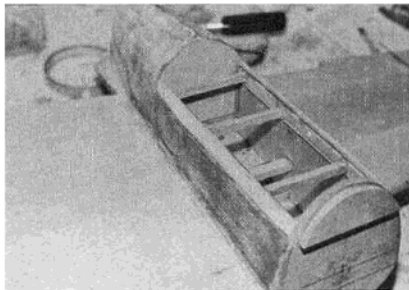
**Nacelle bottom.**



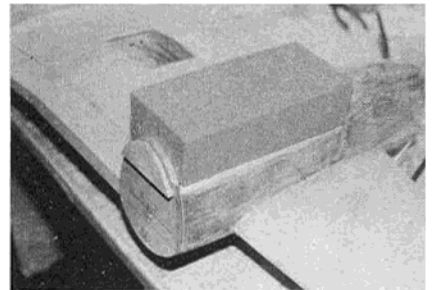
**Micro-balloon filler at stationary section between flaps.**



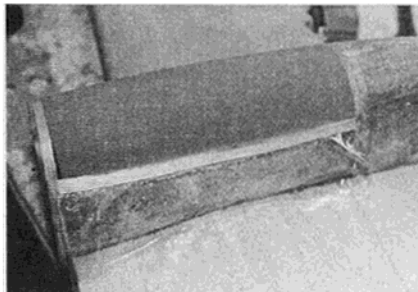
**Hatch frame work.**



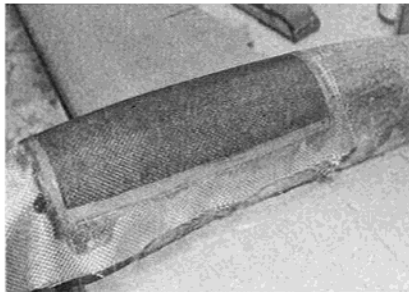
**5/16" sq. rails contoured.**



**Foam block cemented.**



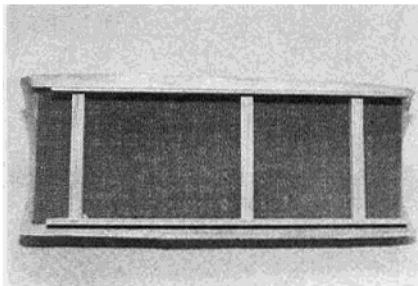
**Saran Wrap shield – ready to glass.**



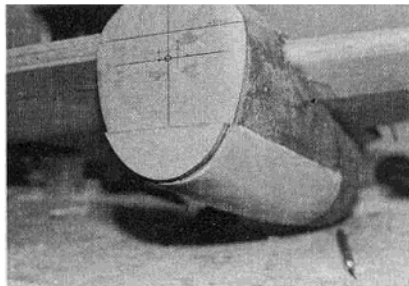
**Glassed with 8 oz. cloth.**



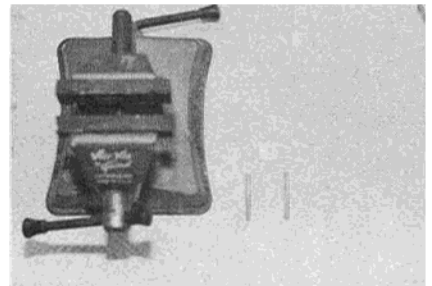
**Micro-balloon slurry.**



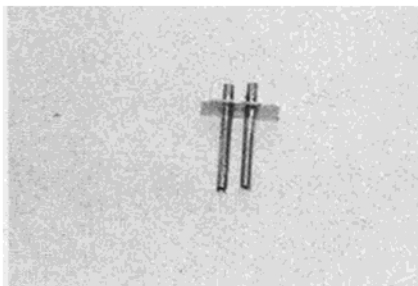
**Hatch bottom complete.**



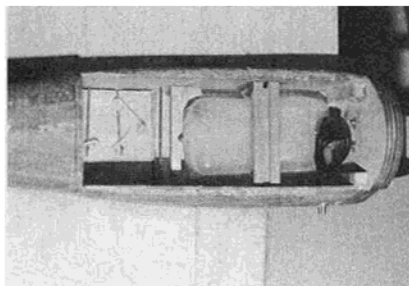
**Hatch in position.**



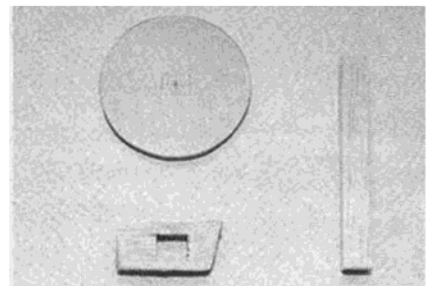
**Fuel filler parts.**



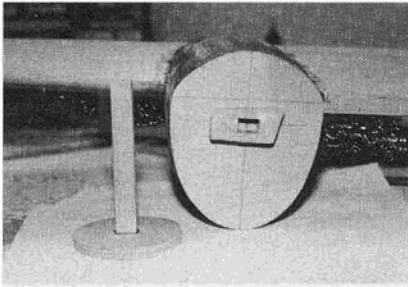
**Fuel filler complete.**



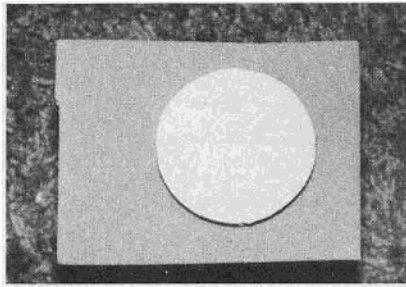
**Landing gear position – fuel tank inst. (note alteration in bottom 3/8" x 1/4" spar to accommodate this tank) – fuel fillers.**



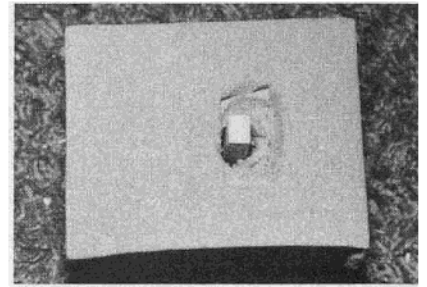
**Parts for cowl alignment.**



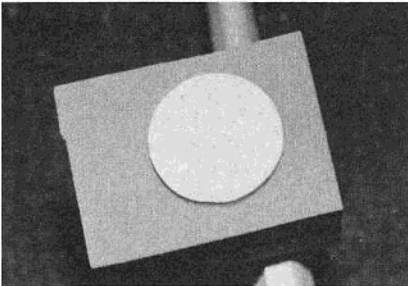
*Alignment pieces in place.*



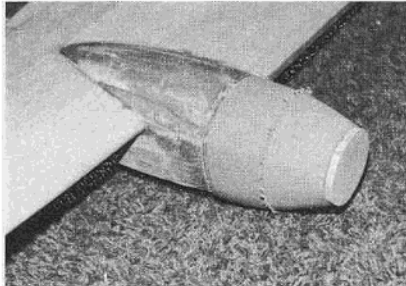
*FW4 cemented to foam block.*



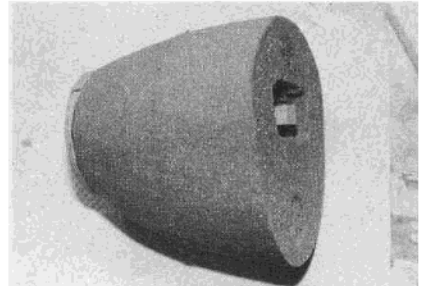
*Foam relieved to fit FW1.*



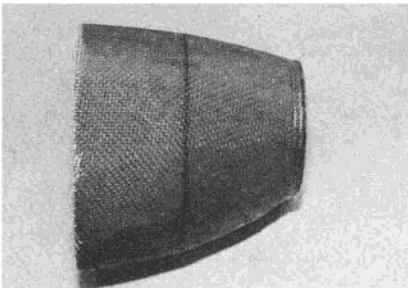
*FW4 and foam block fitted to FW1.*



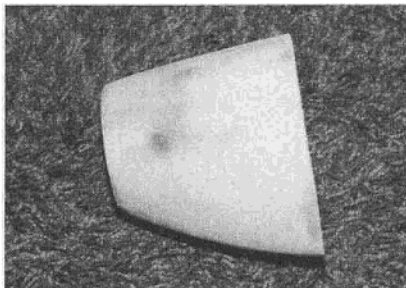
*Cowl contoured - note glue flash.*



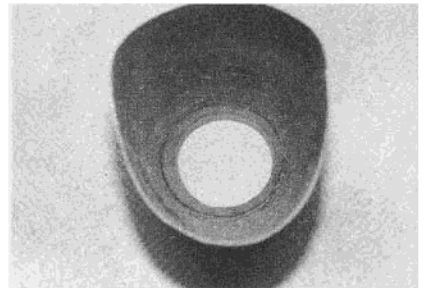
*Cowl off FW1 - ready to glass.*



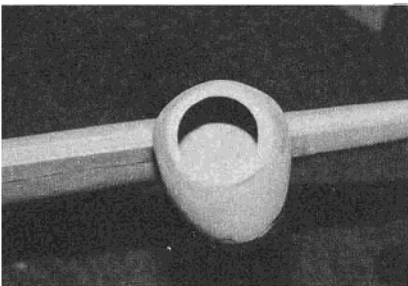
*Glassed cowl with 8 oz. cloth.*



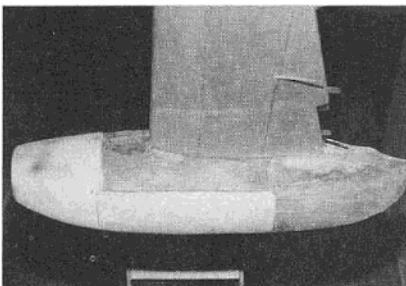
*Micro-balloon slurry.*



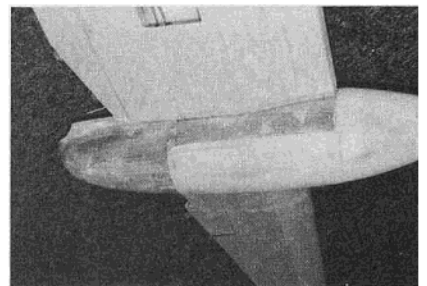
*Cowl with foam removed and opening cut in FW4.*



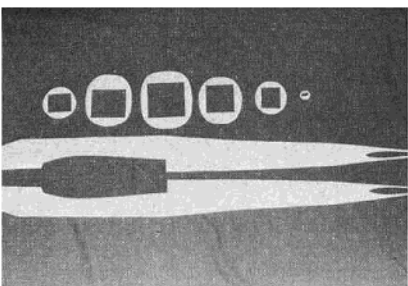
*Cowl mounted of FW1.*



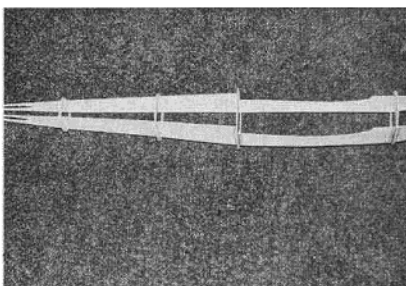
*Hatch and cowl installed - wing tip view.*



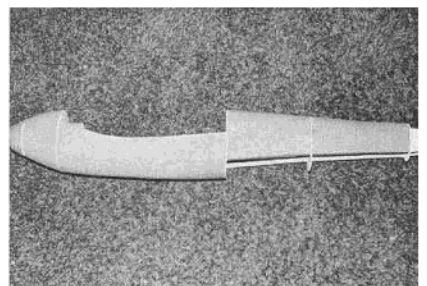
*Wing root view.*



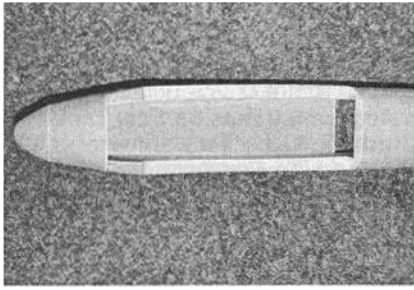
*Ply-lite sections cut out.*



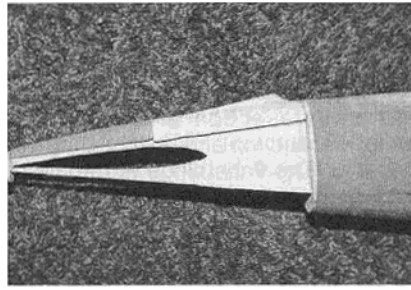
*Fuselage frame work.*



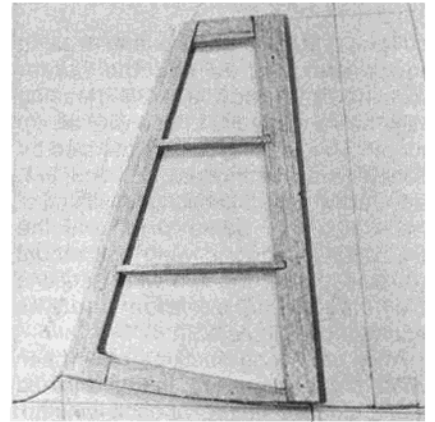
*Foam placement.*



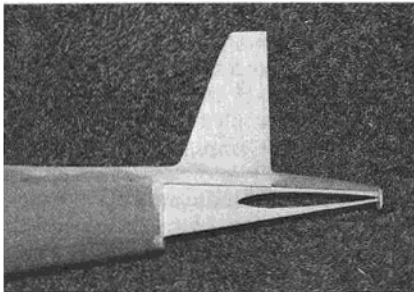
*1/8" balsa wing saddles.*



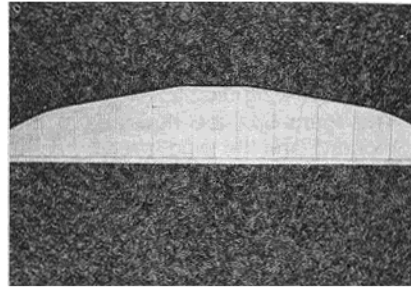
*Balsa rudder base.*



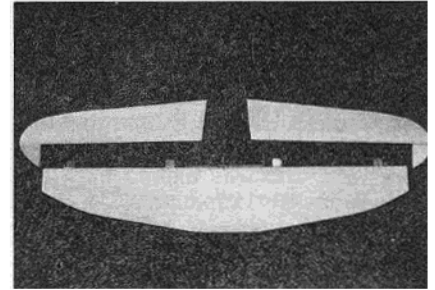
*Rudder frame work.*



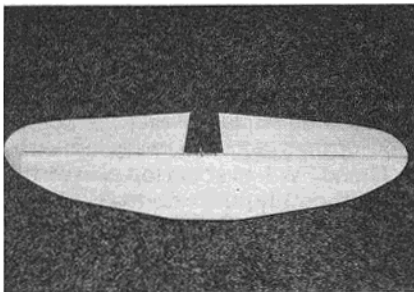
*Rudder installed.*



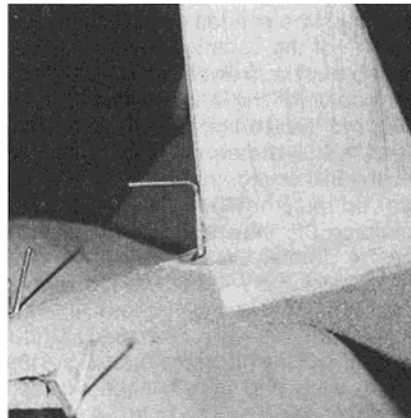
*Horizontal stabilizer frame work.*



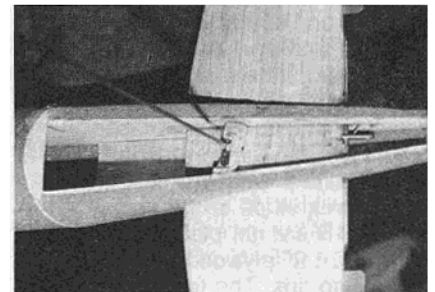
*Stab complete and ready for elevator.*



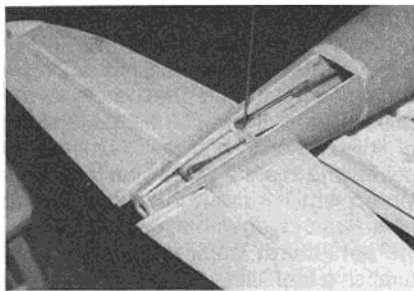
*Stab and elevator.*



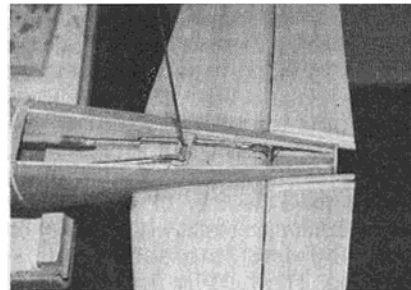
*Rudder control arm.*



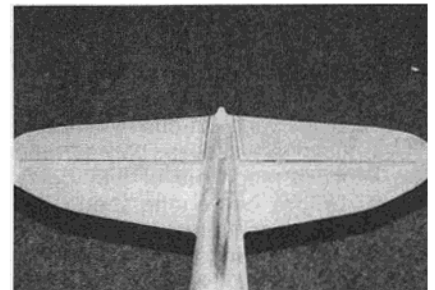
*Control horn soldered in place. Hardwood material drilled and relieved.*



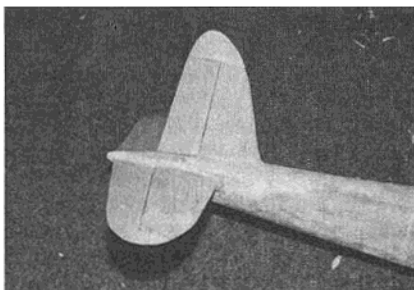
*Pushrods in place - rudder view.*



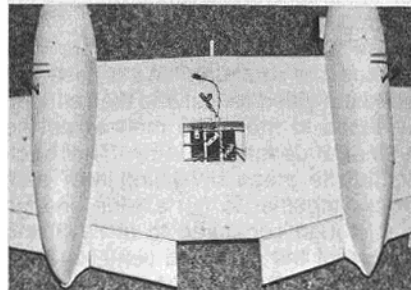
*Pushrods in place - elevator view.*



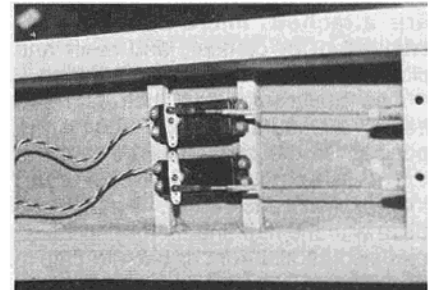
*Top view - completed tail.*



*Side view of completed tail.*



*Servo installation in wing for throttle, aileron and flap.*



*Servo fuselage for rudder and elevator.*

Note that the leading and trailing edges are tapered and the center sections of the wing (3/8" x 3/4") leading edge has a triangular shape with the tip cut off. This leading edge must also be slotted to accommodate W3 and W4. The trailing center section, consisting of the 1/4" x 1/2" balsa strip, and the 3/4" x 3/8" hardwood wing bolt mount are placed after the two wing sections are joined. The skeleton photo is incorrect on this point.

After both wing sections have been framed up and are dry, they are joined with a dihedral of 1 3/4" at each wing tip. After dry, the trailing edge for the center section (1/4" x 1/2") is cemented. This balsa piece goes straight across the two wing sections. The photo showing the frame up of one section is in error here, but subsequent photos show the proper installation. It was discovered that this made the area stronger and easier to work with, and was altered from the original design. Unfortunately, I could not alter the photo.

Now the hardwood mounting block (3/4" x 3/8") is positioned with epoxy.

The plywood braces are now cemented. You won't find these on the plans. A piece of 3/32" plywood is cut to the proper width, placed against the top and bottom spars where it is to be attached, and a pencil line is drawn, and the proper cuts are made. The reason that I did it this way, is that it is very accurate and a slight variation in the amount of the dihedral won't lead to complications with the sheeting. The 3/32" balsa strips at the end of W11A and W11B are not placed at this time, nor is the 1/4" plywood firewall, nor the foam wing tips. The top of the wing is now sheeted with 3/32" balsa completely and also the leading edge segment (from the leading edge to the halfway mark in the 3/8" x 1/4" spar) of the bottom of the wing. When dry, shape and sand the leading edges. Remember that the center section of the leading edge is flat with a 20 degree slant inward (see fuselage wing cut-out).

The stationary section, between the two flaps, is made out of 3/8" balsa sheet. Before cementing, bend the prongs of the control horn to conform with the plans, and install. The 3/8" balsa is then relieved for the horn operation, and cemented. This will appear to be weak, but after the nacelles are attached, micro-balloon filler completed for contour, and resin and cloth placed, they will be very strong.

The bellcranks and their plywood bases are installed next. Juggle the position of the bellcranks so that the 1/16" piano wire pushrods don't interfere with each other. The plywood base with the flap and motor bellcranks can also be slid front or back to help in alleviating congestion. Now the planking of the bottom of the wing can be completed.

The flaps are made from 3/8" balsa with a piece of 3/8" x 1 1/2" tapered trailing edge glued to it. The flaps are installed temporarily and both the flaps and center section are shaped to conform to the top and bottom shape of the wing. The flaps hinge at the upper 1/4th of the flap and the bottom 3/4th is slanted back to accommodate the downward flap movement.

The ailerons are installed next, and shaped. When this is done, the flaps are set in full up position, the aileron in neutral position, and the 3/32" balsa strips are cemented to the W11's and, when set, are shaped to conform to the wing and aileron shape. By doing this, the foam is not left standing out from the body of the wing unsupported.

The foam tips are now added and contoured, and the wing is ready for the finishing of the nacelles.

**Firewall:** The firewall FW1 consists of a 1/4" plywood plate cemented to the leading edge of the wing, W3, W4, and backed by two 3/8" square motor mount stock. The W3 and W4 ribs are already set up so that the firewall has a 3 degree downward tilt. The leading edge of the wing must be sanded so as to continue the line of the contour set up by these ribs so that the firewall sits flush with no gaps between the leading edges of W3, W4, and the leading edge of the wing. After this is cemented with epoxy, the hardwood motor mount material is placed as shown on the plans to reinforce the firewall. At this time, add the 1/4" former FW3 to the back end of the ribs W3 and W4, and the 1/4" former FW2 to the firewall with epoxy.

**Nacelles:** We are now ready to put the foam on the nacelles. Start at the top of the wing and tape a sheet (I used double sided Scotch Tape) of sandpaper (medium garnet) to the wing. The sandpaper should be wider and longer than the finished foam part. Now take a block of foam which has been cut just a little longer than will be needed and, keeping the front of the foam block against the top back of FW1, rub the foam block back and forth (from wing tip to wing root), and after a minute or two you will have the foam block contoured on the bottom so that it will fit closely on the wing after the sandpaper is removed. The foam is now contoured from firewall to tip, and cemented to the top of the wing and finished with 100 grit sandpaper.

The sides of the nacelles are now foamed and contoured. In this case, the sides are glued on first and then sanded to shape in the same manner as the fuselage described later. The back section is made by gluing two foam blocks together to get a wide enough slab, rough contoured to fit FW3, the bottom of the wing and center section between the flaps, and cut out to allow the flap horn to operate freely. The section is now cemented in place, and

contoured.

The wing, flaps, ailerons, and nacelles are now glassed with 2 ounce cloth and sanded lightly.

**Access Hatches To Fuel Tank and Landing Gear:** Two strips of 3/32" plywood 1/2" wide are cut to run along the inside of the Ply-lite nacelle side. They are cut to fit between the motor mount material backing the firewall and the former FW3. They are also positioned so that 1/4" of the strip is above the nacelle side and 1/4" below the side. The three 1/4" square balsa cross pieces are now glued to the plywood strips, firmly holding the strips to the Ply-lite sides. The 5/16" square balsa strips are now laid on the foam and plywood edge of the nacelle opening and against the plywood strip, with the ends of the 5/16" square balsa touching FW1 and FW3 and cemented to the 3/32" plywood strips **only**. When dry, the 5/16" square balsa is sanded to conform to the contour of FW1, FW3, and the glassed foam sides.

A foam block is now added to the assembly. It is glued to the contoured 5/16" square rails, and the 1/4" square braces **only**, and is contoured to match FW1, FW3, and the 5/16" square sides, and the nacelle contour of the plans. When the hatches are finished, they are removed from the nacelle and a sheet of Saran Wrap is placed over the access area, up the inside of the walls formed by FW1 and FW3, over the top of FW1 and FW3 **smoothly**, and extended well over the finished foam and Ply-lite sides of the nacelle. The hatch is now replaced on the nacelle and we are ready to glass the hatch without bonding the hatch to the nacelle, thanks to the Saran Wrap.

The hatch is glassed with 8 ounce cloth and Sig finishing resin. The cloth is extended over the edges of both 1/4" plywood formers (FW1 and FW3). This is the area where the sheet metal screws are used to attach the hatch to the nacelle. After the resin has set, a slurry of finishing resin and micro-balloons is mixed and this is trowled over the hatch. When set, the hatch is sanded to contour, and removed from the nacelle.

**Fuel Fillers:** There are commercially available fuel fillers on the market, but I prefer to make my own because it is easier to control the size, position, and length of various parts. Brass tubes of 1/8" outside diameter are used and are cut to a length that will leave 3/8" of the tubes sticking out on both sides of the foam Ply-lite nacelle wall. A flat piece of brass sheet 1/32" thick is cut to 3/8" x 3/4" square and two 1/8" holes are drilled in it (see photo). The brass plate will be cemented with epoxy against the Ply-lite side of the nacelle (wing tip side), so position the tubes in the brass plate so they will stick out the required 3/8". The tubes are then soldered to the brass plate, installed through 1/8" holes drilled through the

foam Ply-lite wall, and cemented. Make sure the filler assembly will be positioned below the tank (when the wing is upright) and both the air relief tubes in the tank end 1/16" or more below the top wall of the tank. During the flight, this arrangement will lose some fuel from the tanks on maneuvers that tip the nacelle downward, but I have never found this to be a problem. If it worries you, however, a cap for one of the tubes can be fashioned, using a short length of neoprene fuel line, over one tube (after filling the tank with fuel) which has one end crimped shut and sealed with Zap.

**Landing Gear:** The landing gear is bent from 5/32" piano wire, and is held in the landing gear rails with three metal straps and screws. The center of the wheel should be even with the leading edge of the outside wing panel, and the wheels tipped slightly inward to facilitate ground handling. Slots are cut in the hatch covering to accommodate the 5/32" wire. Make sure that the slots are long enough to allow for the backward movement of the landing gear on landing, and wide enough to allow the hatch to be slipped on and off the landing gear.

**Cowl:** The following is a step by step procedure that I worked out. After reading it, you can decide if it is better than the one you have used before. Since the firewall and engine are tilted down 3 degrees, I wanted the front of the cowl to do the same so that the spinner will have an equal gap between it and the FW4 plywood part. To accomplish this, and to also make sure that the engine shaft is centered in the opening, a 4" piece of 3/8" x 1/2" of balsa was used, along with a 1/2" thick piece of scrap balsa which has a square 3/8" x 1/2" hole cut in it. This piece is centered on the center shaft line on FW1 and spot glued to FW1 with a drop of Zap. The 4" piece of 3/8" x 1/2" balsa is cemented on FW4 so that the center of the 4" piece is on the center of FW4 and is perpendicular to FW4.

Two foam blocks (that are 2" thick) are glued together to form a 4" thick block, and a hole is cut through it so that the 4" balsa piece will go through it and relieved so that it will fit flush against FW1. Now the FW4 is cemented to the foam block and, when dry, the assembly is fitted to the scrap block on FW1 and the foam is contoured to shape. Note that on the photo, I got carried away with the glue on the foam and now I have a rubbery flash between the two foam pieces to deal with.

After the sanding is completed on the foam, the foam and FW4 section is removed from FW1 and the piece is now glassed with 8 ounce cloth and, when dry, with resin and micro-balloon slurry, and sanded. The opening on FW4 is accomplished by drilling a 1/4" hole in FW4 and finishing the cut-out with a saber saw. The foam is now scraped

out, the scrap block on FW1 is knocked off, and the cowl is finished.

As you are undoubtedly aware, we have produced a cowl that is not the required 4" long but 4 1/4" long. The extra 1/4" fits over FW1 to accept the sheet metal screws. Part of the 1/4" lip is cut away (at the bottom) where FW2 takes over for anchoring the cowl, while the remainder of FW1 on the bottom is used to secure the front of the hatch, with sheet metal screws.

**Engines:** As you have noted, I elected to install my engines upright instead of inverted. I realize that an inverted installation would have given me a cleaner silhouette on the plane, and if you decide to invert your engines, be my guest, but before you do, read the next paragraph carefully.

The name of the game in twin engine aircraft, is engine reliability. Unless both engines accelerate at about the same rate, take-offs will be a wild ride, especially with a tail dragger like the Mosquito, since the plane will turn into the slower running engine. Actually it is almost impossible to taxi this plane with only one engine running. While in flight, if one engine quits, a twin will spin into the dead engine. The correcting procedure for this is to cut the throttle back to idle, correct with rudder and aileron, give it a little throttle, re-correct, and get it landed as quick as possible. Of course to do this, you need time which means height. Low flying can be dangerous to your twin.

Who needs it!

Even if you get it back down in one piece, the chest pains last for a while. In short, my engines (Enya .40's) are much more reliable upright than inverted. The choice is yours.

**Fuselage:** Cut out both sides and formers F2 through F6 out of Sig Ply-lite, and former F1 out of 1/4" plywood. The F1 former will be placed under a lot of stress when putting the framework together, and some of the areas of F1 are too thin for Ply-lite to hold.

Start by cementing F2 and F3 in place with epoxy. After dry, formers F4, F5, and F6 are cemented. When everything is dry, squeeze the front of the sides together and epoxy F1 in place.

The sides are now ready for foaming. By pressing the framework against the foam sheet, indentations will appear in the foam and give you lines to cut the foam out with. Since the foam we are using is 2" thick, and the sides are less than 1" thick, slice the cut-out sections of foam in half with a bread knife, and you will have made both sides of the section at the same time. Use any cement that you want to use to glue the foam on the Ply-lite. I found that Sig Contact Cement held very well and accelerated construction. There is one precaution when using any cement on the foam, and that is, again, to keep it off the finished sanding line. Make sure the

foam ends 1/8" below the wing saddle area, and that the Ply-lite saddle area conforms to the finished wing area. This is where the 1/8" balsa will be laminated to add strength to the wing saddle. The rest of the foam sides are finished flush with the edges of the plywood. When sanding the foam to contour, the edges of the formers are used to give landmarks to the contour. Sand carefully! The foam, as previously stated, sands quickly, and it is easy to leave the formers standing out like ribs on a starved horse.

The top and bottom sections of foam are added next, with the exception of the area between F5 and F6 and, of course, the cabin area. The nose section can now be made. This section is solid and is made by cementing two 2" slabs of foam together.

The base of the rudder section is made from a block of balsa, and after it is contoured, it is cemented to the plywood sides along with the foam sides. Note that this block extends 1/4" inside the Ply-lite side, and extends from F5 to just the end of the stationary section of the rudder. The remainder of the area between F5 and F6 is filled in with foam to cut weight. This plane has a short nose moment when compared to the tail moment. An ounce of weight saved on the tail of this plane will alleviate a 5 ounce counterweight at the nose. So keep it light. More on this later.

**Vertical Stabilizer:** The construction of the vertical stab is fairly straightforward. The ribs are made from 3/32" x 1/2" strips of balsa and are contoured after being installed in the grooves cut in the leading and trailing edges.

The stab tapers from a rounded leading edge to a height of contour about 2/5ths or 40% back from the leading edge to the 1/4" thickness of the trailing edge. The stab also tapers from the base to the tip, ending at the tip at 1/8" thickness at the leading and trailing edges. The outline of the base is shown on the plans.

After the leading and trailing edges are tapered, the ribs are cemented and contoured. The 1/16" sheeting is added and, after dry, a 3/32" capstrip is cemented to the top of the stab and sanded to contour after dry. The base of the stab is left open, and is cemented with epoxy to the balsa block on the fuselage.

**Horizontal Stabilizer:** Only two things to mention here. The 3/32" balsa capstrips at the ends of the stab are placed after the sheeting is finished, and contoured to shape as was done in the vertical stab, and the elevator horn is installed off-center as shown in the plans. The horn is much too long to be accommodated by the fuselage contour, and is cut off after the first hole. **Save** the leftover piece. It will be used for the

control horn of the rudder.

**Tail Assembly:** The horizontal stabilizer is inserted into the slots previously prepared in the fuselage, and cemented. Now a 3/32" piano wire is bent at right angles to form the section of the wire that fits into the rudder, and is then pushed down through the fuselage, as close to, and parallel to, the horizontal stab as possible. The wire also passes through the horizontal stab installed earlier. The wire is removed, the 1/8" outside diameter brass tube is slid on, and the wire is reassembled in position, and cemented with epoxy. The motor mount material is then drilled to accept the brass tube (tight fit needed), and the piano wire end of the pushrod for the elevator control. This opening should be made fairly large.

The brass tube ends flush with the hardwood block, and the metal piece of the control horn that was left from the elevator is soldered to the 3/32" piano wire but **not** to the brass tube. Relieve the hardwood to allow for easy movement of the rudder clevis.

The foam section between F5 and F6 is cemented after it is relieved inside to allow for the easy movement of the elevator control horn. The pushrods are installed prior to the cementing of this foam section.

The foam is contoured, a brass wing control outlet (U-control part) is slid over the 3/32" piano wire and into the foam to give a hard base to the tail wheel wire, and the tail wheel wire is bent for the tail wheel.

**Cabin:** Two blocks of foam are cemented together to form the cabin. You will note on the plans that the rear wall of the cabin is a plywood former F3A. This is cemented to the rear of the foam to give strength to the wood dowel that anchors the back part of the cabin to the fuselage. The front is left in foam, and is held in place by a strip of Velcro which is half cemented to the cabin and the other half cemented to the 3/8" x 3/4" hardwood stock. This arrangement is more than adequate to hold the cabin in position during flight since the wing assembly is held on independently. The contouring of the part of the cabin that fits against the wing is a little difficult and I have little to suggest except a sand and fit method. After contouring, the entire cabin is glassed with 2 ounce cloth, and resin and micro-balloons are used to close any gaps that appear between the cabin and the wing-fuselage.

As with the fuselage, sanding must be held to a minimum on the glassed foam. If you find yourself cutting into the glass cloth very much, another cloth and resin coat is in order.

**Center of Gravity:** Now for the moment of truth. If you have built carefully, and light in the tail section, your C.G. will be close to the 3/8" x 1/4" main spar of the wing, and your plane will weigh 9 pounds fully loaded, and your wing loading will be a comfortable 31 oz./sq. ft. If, on the other hand, you build a little heavy like I do (I have a small dog house in the backyard I built that takes three people to lift), then you will find yourself at the sporting goods store buying a one pound lead weight (for \$1.50 no less, adding insult to injury) to bury in the nose of the plane. You will also now have a 10 pound aircraft with a wing loading of 35 oz./sq. ft. The plane does very nicely at this weight, but would probably be safer at the lower weight and lower wing loading. The Center of Gravity is set at the main spar of the wing.

**Flying:** The day of the initial flight was marked by my usual reaction to a first-time flight of a scratch-built plane. I looked over the plane and found a dozen areas that could fail - - - contours that were not right, and a dozen other assorted doubts - - - the vast majority of which were groundless. So I packed up my gear, and headed down to the flight field.

I have made it a practice never to test fly a plane of my own. I don't want months of building to stand in the way of a needed snap decision. I also want someone with a lot of experience in getting out of tight spots to have that job. I happen to be very lucky to have a friend who fits that bill. His name is Colby Evette - - - he has logged a lot of time with twins, and he owns the hobby shop where I get my goodies.

At any rate, Colby started the taxi, the tracking was good, and the next thing I knew the Mosquito was airborne and banking into the usual left bank upon clearing the runway. Colby found that the trim was about right on (it needed a little up elevator) and he was off on a series of rolls and loops.

The landing was a little hairy the first time. We had some concerns about the high wing loading, and reduced wing tip area because of the design of the wings, and came in a little fast, but the plane didn't show any vicious tendencies. The next landing was slower and, with the flaps down, settled into a real nice three point landing. We found that we had to cut down the aileron though so I could fly it. The way it was originally set-up, it was just a little too touchy for me. After the controls were adjusted for the Sunday Flier (me), I found that it was as easy to fly as a low wing trainer.

During the test flights, we never lost an engine, so I can't tell you how it will fly in those circumstances, and I hope I never find out but, as previously stated, there are procedures to follow when this happens, and they do work if you have the height (time).

When you go out to the flying field with this craft, take along plenty of fuel. Until you have experienced it, you can't believe how much fuel two hungry .40's can swill. When I got ready to leave for the day, I thought I lost something out of my tote box, until I realized that the gallon fuel can was almost empty.

Good luck - - - hope you enjoy building and flying your Mosquito. □

**From  
RCModeler  
Nov. 1978**