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Top view of the Mosquito IV shows the amount of detail that can be incorporated into simplest of scale models. Framework is held to a minimum for low weight and good flight performance.

MOSQUITO IV SERIES I

If you're tired of the conventional wind-up-and-go, this unique twin-engined rubber-powered scale version of the famous World War II bomber is your plane. It sure is different.

► One of the immortals of World War II, the de Havilland Mosquito revolutionized bomber concepts of its day. Built almost entirely of wood and carrying no defensive armament, its speed was equal to or faster than that of contemporary fighters. Indeed, the speed and maneuverability of the bomber prototype was so remarkable that a fighter version was also built.

This model is based upon the first bomber variant flown in 1941. Built rugged but light this plane flies fast and low. Flights in calm or slightly breezy conditions average 40 yards or better with the model seldom rising higher than ten feet. She's no endurance champ and loops are out of the question but properly trimmed, this model flies well enough to make you proud to own her.

Study the plans and construction notes carefully before you begin building.

Building: Start by building the motor and nacelle spools. Cut four 3/4 inch diameter and four 3/8 inch diameter circles from soft 1/8-inch sheet balsa. Cut three 1 1/4 inch diameter and four 3/4-inch diameter circles from 1/16 inch sheet. From 1/32 inch piano wire cut one piece 2 1/4 inch, two piece 4 inches,



Author and his little flying machine ready to go. Good flight photo of the Mosquito underway.



Hardwood dowel is used to hold motor spool while winding this motor. To fly, just withdraw dowel. Author has removed locking dowel and released model for a good power flight. Note gentle launch.



and three pieces 1 3/8-inches long. At one end of each of these pieces of wire bend a right angle hook 1/8 inch across and 1/16 inch back. Pierce the centers of all the balsa circles with a common straight pin and begin spool assembly. Using a piece of 1/32 inch wire as a guide, assemble the motor spool by sliding one 1 1/8 inch circle (1/16 inch sheet) and two 3/4 inch circles (1/8 inch sheet) onto the wire. Glue these three circles together while on the wire. It is critical that the spool be properly aligned so be sure all the circles are at right angles to the wire and that the "spool" does not wobble when rotated. When these first three circles have been properly aligned and cemented slide but don't glue another 1 1/8 inch circle in place followed by two more 3/4 inch circles (1/8 inch sheet) and another 1 1/8 inch circle. Align and glue the last four circles together. You should now have two pieces consisting of three and four circles respectively. Slip one half of the motor spool onto the 2 1/4 inch piece of wire carefully sinking its hook into the side that will face the other half of the motor spool—make sure that the wire hook doesn't stick up because it will make joining and properly aligning the two halves of the motor spool very difficult. Repeat with the other half of the motor spool using one of the 1 3/8 inch

pieces of wire. You now should have two sandwich-like pieces of balsa, each with a piece of wire passing at right angles through its center. Complete the assembly of the motor spool by cementing the two halves together. Twirl constantly to be sure that the wire shafts are properly aligned—when they are, neither one will wobble when the spool is rotated. Set the motor spool aside to dry.

The nacelle spools are made in the same manner as the motor spool but are more simple. Carefully align and cement each of the four 3/8-inch circles (1/8-inch sheet) to each of the 3/4-inch circles (1/16-inch sheet). You now have four pieces. Take two of these pieces and slip one on each of the two 4-inch pieces of wire. Take the other two pieces and slip one on each of the remaining two pieces of 1 3/8-inch wire. In each case be sure that the wire hook is imbedded in the 3/8-inch circle (1/8-inch sheet). Now assemble the nacelle spools by gluing each piece with 4-inch wire to one with a 1 3/8-inch wire. Again rotate the spools being sure that the wire shafts are in line and that the spool does not wobble. Set aside to dry.

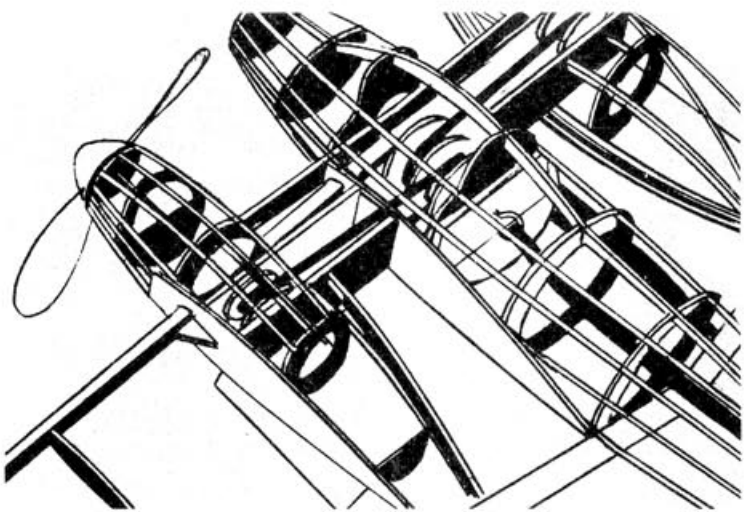
To finish the motor spool slide one 1/4-inch brass cup washer, concave side toward spool, down each of the wire shafts and cement in place. On the longer piece of wire slide one or two flat washers, another 1/4-inch cup washer and a 1/2-inch hard wood thrust button. Now bend the remaining part of the longer piece of wire into a loop since this is the side to which the rubber motor is attached.

Finish the nacelle spools by sliding one 1/4-inch brass cup washer, concave side toward spool, down each of the four wire shafts and cement in place.

Now let's begin work on the air frames. Cut all fuselage formers and the two keel pieces from 3/16-inch sheet balsa. Formers 9 and 10 are cut from 1/8-inch sheet and glued together as one piece. Glue all formers except number 4 into their proper places on the keel and set aside to dry. Stringers will be added only after the wing and motor units are installed.

In the same manner as the fuselage, cut the nacelle keels and formers from 1/16-inch sheet. Note that the first nacelle former is made from two pieces of 3/16-inch sheet cross-laminated. Glue the first three formers onto the longerons for each nacelle and set aside to dry.

To build the wing, cut ribs 1 and 2 and pieces W-1, 2, and 3 from 3/16-inch sheet. Ribs 3, 4, and 5 are cut from 1/16-inch sheet balsa. The leading edge is a piece of hard 1/8 by 1/4-inch strip balsa. Pin down the leading edges being sure to block them up 1/4-inch where they meet.



To wind motor, withdraw rear plug from fuselage, engage rear hook with another prop and then wind.

Do not glue the leading and trailing edges where they meet at this time. Now glue ribs 2, 3, 4, 5, piece W-3, and trailing edge in place. Cement one 3/16-inch brass bushing onto the spool side of pieces W-1 and W-2. Be sure that a piece of 1/32-inch wire passed through these bushings turns freely and is perpendicular to these pieces. Now cement ribs RR-1 and LR-1 in place using pieces W-1 as guides to assure that these ribs are properly slanted. Glue pieces W-1 in place and check the fit of pieces W-2 but do not glue the W-2's yet. Let the wing dry.

The rudder and stabilizer are built from 1/16-inch square strips. Pieces S-1, S-2 and R-1 are cut from 1/16-inch sheet. Build the stabilizer as a single unit although you will have to cut the center sections away when you glue it to the fuselage.

While the frames are drying cut pieces W-4 and W-5 from 1/16-inch sheet and cement together. This will be the major structural piece joining the two wing halves. Also at this time cut the three smaller wing braces (WB) from 1/8-inch sheet. Cut eight right angle gussets 3/8-inch on a side from 1/16-inch sheet and four 3/8-inch gussets from 1/8-inch sheet—these will be cemented to ribs RR-1 and LR-1 and formers F-5 and 6 to further brace the wing when it is glued in place.

Remove the wing halves from the plan and shape the leading and trailing edges with a single-edged razor and sandpaper. Glue one 3/8-inch gusset (1/8-inch sheet) between rib 2 and the leading edge. When the wing halves are shaped, pin them back over the plans one at a time and slip the nacelle spool through the bushing in W-1. Place a #32 rubber band over the spool and slide W-2 in place. It is very important that the wire shaft of the nacelle spool line up exactly with the thrust line on the plans so take your time and make sure of this. Also it is important that the nacelle spool spin freely when in place. Friction in the nacelle spool is your biggest enemy because it can drastically reduce power output and flight performance. With the nacelle spool and rubber band in place, aligned, and free spinning, you are now ready to slide the partially completed nacelle in place. Carefully thread the wire shaft through the first three nacelle formers so that it protrudes well beyond the first former. Glue the tail-end of the bottom nacelle keel so that it is flush with the trailing edge of the wing and 3/8-inch in from rib 2. Slip nacelle formers 4 and 5 onto the keel and glue in place. Now glue nacelle former 3 to rib 2. Again make sure that the wire shafts are aligned and that

the nacelle spools are free spinning.

Glue the 1/2" hardwood thrust button which is attached to the motor spool to the fuselage former 4. Make sure that only the thrust button is glued to the former as the motor spool itself must spin freely when in place. Next, add the 1/8" sheet crossbrace to the back of former 4. Then place former 4 on the longerons but do not cement in place. We are now ready to join the fuselage.

What follows is the most difficult part of construction so work slowly and carefully. Slip the rubber band from the left nacelle spool over the rear part of the motor spool. You will notice considerable tension after doing this. To alleviate this, drive a couple of straight pins into your work board and rest the left wing against them so that you can pull on the motor spool and the left wing will remain stationary. Glue the laminated dihedral piece (W-4, 5) to the front ends of ribs 1 and 2 of the left wing. Now slip the rubber band from the right nacelle spool over the front part of the motor spool. Again use straight

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pins to hold the right half of the wing in place. Finish gluing the laminated dihedral piece in place by cementing it to the first and second ribs of the right wing. Now cement the two leading and trailing edges together and add the small dihedral braces ($\frac{1}{8}$ -inch sheet) below them.

Align the wing so that the nacelle shafts are parallel to the thrust line of the fuselage. The nacelle shafts should also be parallel with each other from all angles. Now glue ribs 1 to fuselage formers 3, 5, and 6. Adjust former 4 so that the rubber bands pass directly from the motor spool to the nacelle spools without touching any part of the plane but these spools. You may have to cut away part of the first ribs to keep the rubber bands from rubbing across them. The main thing is to eliminate friction while keeping the rubber bands within the confines of the wing. To better align the motor spool, slip the short wire shaft through a $\frac{1}{4}$ -inch brass washer glued to the center of a $\frac{1}{8}$ -inch sheet brace. The brace is glued to the back of former 3 so that it holds the motor spool parallel to the nacelle spools. To further strengthen the wing's attachment to the fuselage cement eight $\frac{3}{8}$ -inch gussets ($\frac{1}{16}$ -inch sheet) about formers 5 and 6. Glue former 4 in place and cement the $\frac{3}{8}$ -inch gussets ($\frac{1}{8}$ -inch sheet) behind it.

With the wing properly aligned the most difficult part of construction is over. Now glue the $\frac{1}{16}$ -inch square stringers on the fuselage and nacelles. Insert the base pieces for the stabilizer so that a $\frac{1}{16}$ -inch square strip passed through their slots is horizontal. To facilitate covering, glue in two false rib pieces about each nacelle. Some $\frac{1}{4}$ -inch strips of $\frac{1}{32}$ -inch sheet balsa cut cross grain should also be added to the wing roots and the top of rib 2 to serve as anchors for the tissue covering.

Landing gear is optional and, if made, should be detached when flying. To make it use $\frac{1}{32}$ -inch wire, $\frac{1}{8}$ -inch hardwood doweling, 1-inch diameter wooden wheels, and scrap balsa. A simple receptacle on each nacelle is made from scrap $\frac{1}{8}$ -inch stock. To insure a close fit with the nacelle, the wheel doors should not be glued on until the model is resting on its gear. Be sure *not* to glue the doors to the nacelle as they should detach with the gear as a unit. The tail wheel is made from $\frac{1}{16}$ -inch sheet scrap.

To provide an access hatch to the wire hook from the motor spool cut away the first stringers on each side of the bottom fuselage longeron between formers F-4 and F-6. Cut bomb-bay doors from soft $\frac{1}{8}$ -inch sheet, sand to conform to the curve of the fuselage and attach them to the second stringer on each side with strips of tissue. The tail block may now be carved from a balsa block and fitted with the rear motor hook also fashioned from $\frac{1}{32}$ -inch wire. Eight strands of $\frac{1}{8}$ -inch flat rubber power the model and may be installed at this time so the bomb-bay access hatch can be papered shut. To change the rubber motor simply open the bomb bay. Now cut a 4-inch length of $\frac{1}{8}$ -inch hardwood doweling. This will be passed through the hook from the motor spool to keep it stationary while the rubber motor is wound from the tail. To hold the retaining dowel in place, cut two $\frac{1}{2}$ by $\frac{1}{4}$ -inch retainers from $\frac{1}{8}$ -inch sheet and pierce the center of each with a $\frac{1}{8}$ -inch diameter hole. Now fit one retainer between the stringers connecting formers 4 and 5 just above the left bomb-bay door. The hole should line up with the wire loop from the motor spool. Next insert the retainer dowel into the retainer and thread it through the wire loop. The second retainer should be placed to the right of the top longeron between the first and second stringers joining F-4 and F-5. The retaining pieces should be aligned so that the retaining dowel passes

When all the frames are built and carefully sanded you are ready to begin covering your model. The original was papered with yellow Japanese tissue. Take your time on the fuselage and nacelles and work with small pieces of tissue. Brush a coat of clear dope around the outline of the area you are going to paper and let it dry. Sand lightly to remove the fuzz. Cut a piece of tissue large enough to cover the area. Apply another coat of dope around the outline and attach the tissue before it dries. Be sure the tissue is as taut and wrinkle-free as possible.

The wings are papered on the underside first. Use two pieces of tissue: one for the inboard section between nacelle and fuselage and one for the inboard section of the wing. The top wing surfaces are papered in several sections. If you intend to paint your insignias it is wise to draw the circles on the tissue before attaching it to the frame. Wing roundels are the "B" type and measure 1 $\frac{3}{8}$ -inch in diameter. Fuselage roundels are the "A.1." type used from June 1940 to June 1942 and measure 1 $\frac{1}{2}$ -inch in diameter.

Cover the rudder with one piece of tissue to a side. Similarly cover the stabilizer. Now cut away the tissue and first two cross-braces from the center section of the stabilizer leaving $\frac{1}{8}$ -inch stubs to attach to the fuselage. Leave the rear most piece of the stabilizer intact to help steady it when you attach it to the fuselage. When the frames are covered, water spray to shrink the tissue and, when dry, brush on one thin coat of clear dope. Since the prototype was painted yellow overall you can leave the model this color and be authentic. One obvious advantage is the weight saved by not color doping. If you wish to camouflage your model apply a wavy pattern of dark green and dark earth to the upper surfaces and sky blue to the lower surfaces.

The canopy and nose bubble are molded from celluloid by heating it over a hot-plate and then forcing it over a balsa mold. This method may also be used to make the spinners. If you don't want to mold these pieces you can cut the canopy pattern from sheet celluloid and glue it to formers 3 and 4. Also the nose bubble may be carved from a balsa block and painted black or, if you wish, converted to the fighter-type nose.

Slip a $\frac{1}{4}$ -inch cup washer and a 4-inch Kaysun plastic prop onto each nacelle shaft. The considerable length of wire protruding beyond the propeller should not be cut but left as a "reserve" in case you need to change the propeller. Bend this extra length of prop shaft back on itself so that it fits along one side of the propeller. A 1-inch Kaysun spinner may now be slipped on to complete the propeller assembly. The Kaysun spinners are more pointed than those of the real plane so you may want to mould your own or carve them from balsa.

Trim the model for flight by gliding it over tall grass. Add noseweight as needed until a long smooth glide is attained. Push the retaining dowel through the wire motor loop being careful not to go through the top of the fuselage. Now attach a conventional propeller and thrust button assembly or a mechanical winder to the loop in the tail block. Two hundred and fifty winds by hand will provide enough power for test purposes. When wound, reinsert the tail block and detach the propeller-winder apparatus. Remove the retaining dowel and launch the model. If the model stalls, bend the stabilizer down and add more nose weight. Properly trimmed the model climbs under power to about ten feet and then levels off for a fast flat glide. Flights of 40 yards or better have been attained with 400 winds by hand.