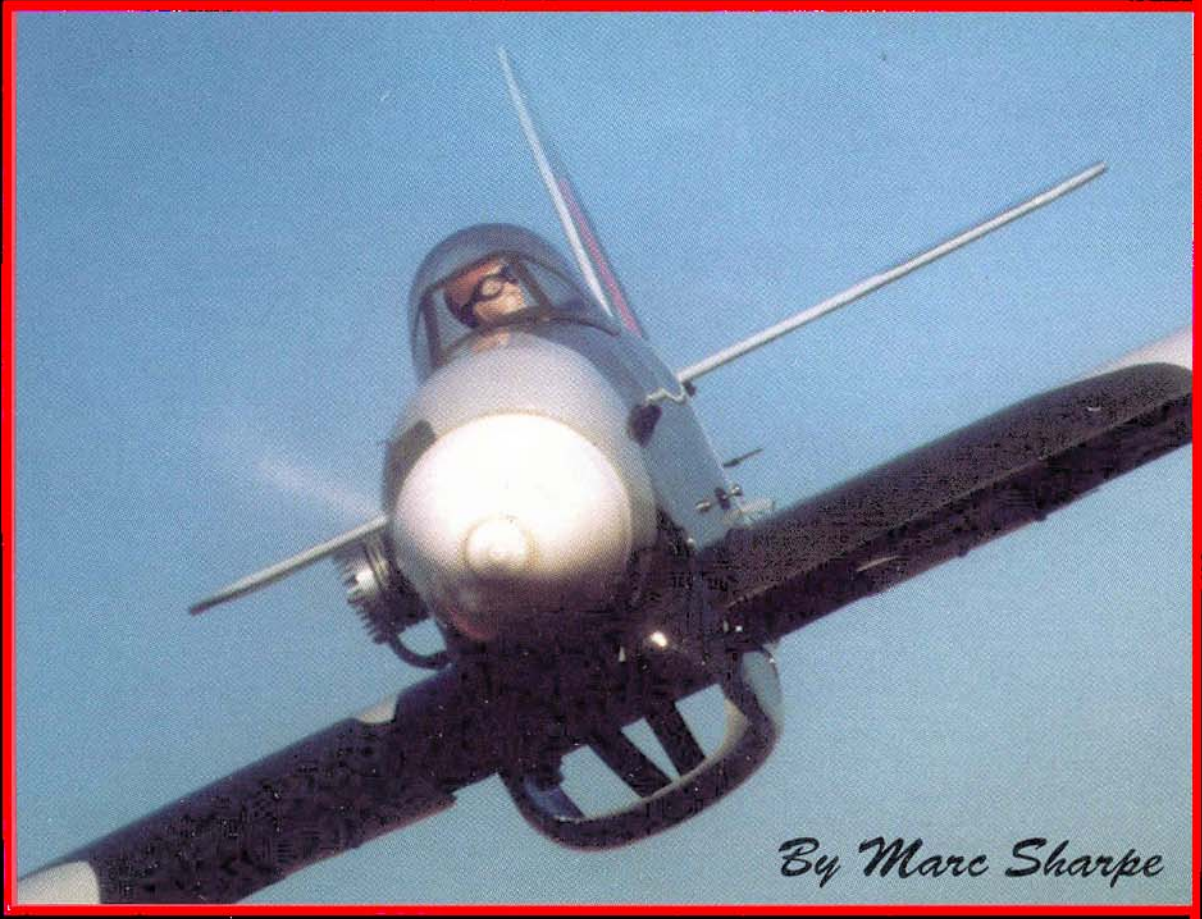
HAWKER TYPHOON



By Marc Sharpe

SPORT SCALE WWII FIGHTER FOR .46-.70 ENGINES

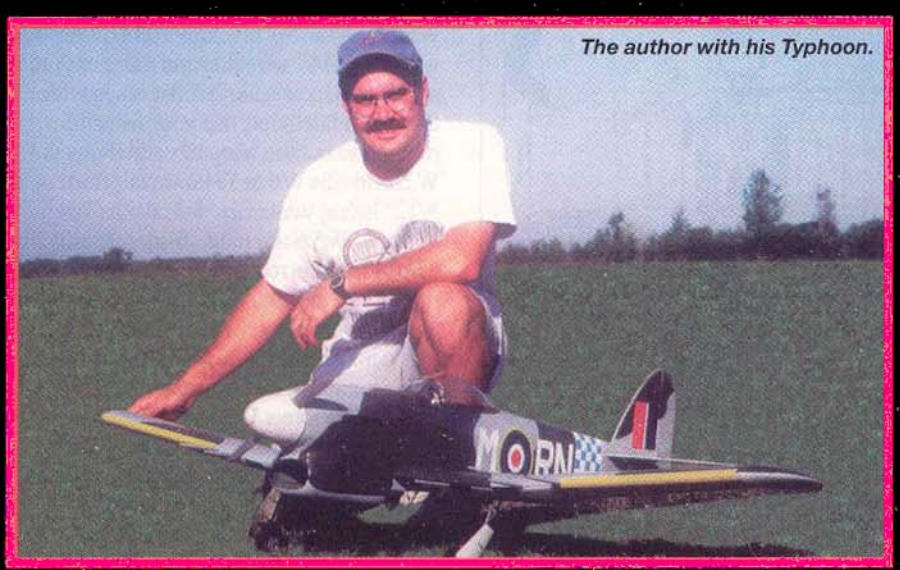
On September 3rd, 1939, twenty-five years before I was born, final completion of the first Typhoon took place. In my opinion, it was one of the most intimidating looking aircraft produced during WWII. Its large radiator chin cowl and four 20mm cannons protruding from the leading edge gave it such an aggressive look, it quickly became one of my favorites in a long line of the WWII planes I find so intriguing.

Originally, the Typhoon was designed to replace the "Spitfire" and the "Hurricane" as a 400+ mph, high altitude fighter. It was much larger than its predecessors and came with a newly developed, 24 cylinder, 2200 hp Napier Sabre engine, nearly twice the horsepower of the Spitfire's Merlin. With the outbreak of war, the Typhoon project was rushed into service before a number of major problems had been corrected which gave the plane an early reputation that was less than flattering.

The first of the two major problems was the new Sabre which required tremendous maintenance and had a rather nasty habit of quitting for no apparent reason. For a time, the pilots nick-named the Typhoon the "Tiffie glider." The second, and more serious problem, was the complete structural failure of the rear fuselage which took the lives of some 26 RAF airmen. These problems, coupled with the fact that the Spitfires and Hurricanes still performed better above 20,000 feet, almost spelled the end of the entire Typhoon project.

Persistence paid off as the engine difficulties were worked to acceptable ranges and the cause of the structural failure was traced to an improperly balanced elevator which induced flutter that caused the rear of the fuselage to break apart. With these problems solved, and the realization that what had been created was a superb low level combat/attack aircraft, not a high altitude fighter, the Typhoon came into its own.

The Typhoon proved to be a very stable platform for rockets (carrying as many as twelve), bombs (up to 2000 lb'ers), making it ideal for search and destroy missions over enemy territory. It was used for close support, anti-shipping strikes, buzz bomb interception, and in low level aerial combat it could out-run, out-turn and out-gun its German rival, the Focke Wulf 190, playing a major role in the lead up to and support of D-day operations. The Typhoon was also incredibly rugged, able to withstand damage that would down most other fighters, returning its pilots safely to base. Numerous accounts exist of ground crews removing the tops of trees from the chin cowls collected during very low level "activities," with one recorded incident of a Typhoon actually skipping off the channel waters during a shipping attack and returning home with its propeller tips bent at 90°. The eventual success of the Typhoon led to further evolutions, which are known to most as the "Tempest" and "Sea Fury."



The author with his Typhoon.

HAWKER TYPHOON

Designed by:
Marc Sharpe
TYPE AIRCRAFT
Sport Scale
WINGSPAN
68 Inches
WING CHORD
11-1/2 Inches (Avg.)
TOTAL WING AREA
782 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
2-1/2 Inches
OVERALL FUSELAGE LENGTH
46 Inches
RADIO COMPARTMENT SIZE
(L) 13-1/2" x (W) 4" x (H) 4"
STABILIZER SPAN
21-1/2 Inches
STABILIZER CHORD (inc. elev.)
7-1/4 Inches (Avg.)
STABILIZER AREA
156 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
7-1/2 Inches
VERTICAL FIN WIDTH (inc. rud.)
7-1/4 Inches (Avg.)
REC. ENGINE SIZE
.46-.60 2-Stroke, .52-.70 4-Stroke
FUEL TANK SIZE
10-14 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4-5
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail., Retracts
C.G. (from L.E.)
4-1/2 Inches (at Fuselage)
ELEVATOR THROWS
1/2" Up — 1/2" Down
AILERON THROWS
3/8" Up — 1/4" Down
RUDDER THROWS
1-1/2" Left — 1-1/2" Right
SIDETHRUST
0
DOWNTHRUST/UPTHRUST
0

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	Balsa
Wt. Ready To Fly	128 Oz. (8 Lbs.)
Wing Loading	23.5 Oz./Sq. Ft.

That being said, I liked the plane and couldn't find much in the way of a kit in the .40 to .60 size range, so I decided to make my own. I was just starting my 4th year in the hobby so my experience rested with four or five planes I had built from plans, some reading, and an invaluable Chuck Cunningham article I found in an old October '89 issue, entitled "R/C Design Made Easy." I originally wanted the plane to fly on a .46 sized engine, but to be larger than your average-sized .40 sized plane and fly like my favorite sport plane, Fred Reese's "Cloud Dancer." The plane ended up with a 68" wingspan and came in slightly under 8 lbs. with retracts. This put the wing loading at a very comfortable 23.5 oz. per sq. ft. As far as power, anything that will swing an 11 x 7 prop in the 11,000 rpm range will work fine. I used a simple O.S. FP .60 and the Typhoon has been clocked on radar around 80 mph, straight and level and close to 110 mph after a dive. One of the new .46's would do just as good a job and I think O.S.'s new .52 4-stroke would be ideal. You will not do this plane justice by strapping some oversized power plant on the front. As is, it exceeds all my performance expectations, so fight the urge to send it on an unlimited vertical. It's relatively light for its size and could be lighter if someone wanted to do an electric conversion. Let's get on with it, shall we.

CONSTRUCTION

As usual, the smartest thing to do would be to study the plans and cut out all the parts prior to spilling any glue. (I might even follow this advice myself some day.)

Wing:

First thing you must do is decide on fixed or retractable landing gear. Personally, I have trouble watching a warbird fly with the wheels down, so I went with the Spring Air's 103 HD set with the 3/16" wire. I found them easy to install and have had no difficulties with them. That decided, use your favorite method to cut the wing ribs out. Ribs W1, W2, and ribs W6 to W12 are cut from 3/32" balsa, while ribs W3, W3A, W4, W5, and W5A are made from 1/8" ply. Choose the correct landing gear mount/rail cut-outs from the plans on the ply ribs. Make sure you drill the pushrod guide holes in the ribs now as well as holes for air lines if using retracts.

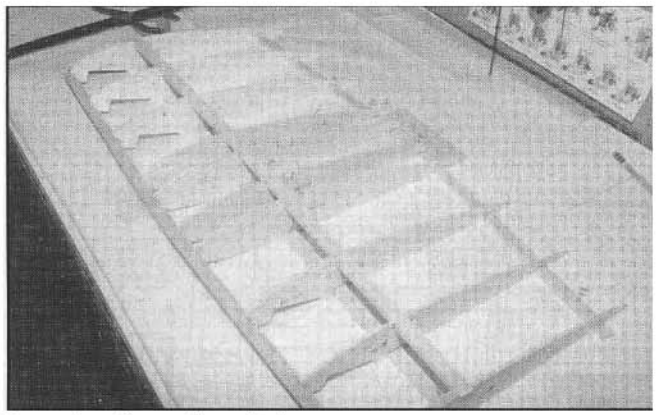
Glue doublers W3A and W5A on their respective ribs. Starting with the wing center section, pin the bottom main 1/2" x 1/4" balsa spar onto its proper location on the plans. Using a couple of ribs, position the rear 1/2" x 1/4" balsa spars and pin them in place, butt gluing them at the joint. Glue ribs W1 to W5 in their respective positions. Glue the top 1/2" x 1/4" main spar in position, followed by the 3/8" sq. balsa leading edge. The leading edge of this center section is one piece, so attaching it to the W1 ribs first and working your way out to the W5 ribs works best. Glue in the wing bolt mount plate, made from 1/2" balsa and contoured to the shape of the airfoil. Add the 1/8" ply shear webs between the W2 ribs, followed by the remainder of the shear webs fashioned from 3/32" balsa. Glue the 1/8" ply servo/retract bay floor between the W1 ribs. Now, using the detail on the plan as a guide, add the balsa fill and 1/8" ply reinforcement on the inside of the leading edge where the wing hold-down dowels will pass through. Flatten the leading according to the plan between the W2 ribs and add the 1/16" ply plate to the front.

For those of you who will be installing retracts, you must now add the wheel bays. I made mine from an appropriate-sized plastic pop bottle and it worked perfectly. Contour the top of the bay to match the airfoil and fill the area around the bay with 1/8" balsa flush with the top of ribs W2 and W3. Apply the 1/16" balsa sheeting, using the plan as a reference and the capstrips on the W3 ribs.

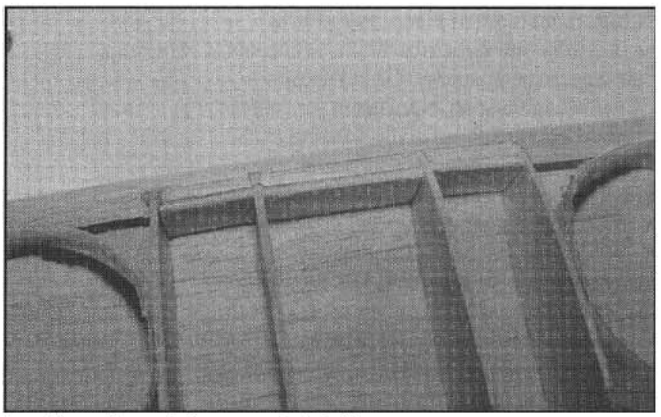
Remove the center section from the plans and turn it over. For fixed gear, epoxy your grooved landing gear blocks in place. Epoxy the vertical piece of grooved block up against W3A (see plan detail) and the indicated balsa triangle reinforcements.

For those of you doing the "retract thing," contour the bottom of the bay and add the 1/8" balsa fill, same as the top. Have your chosen retracts on hand and fit them to the 1/4" ply rail mount. Drill and set your blind nuts and do whatever carving and fitting necessary prior to securing them permanently or you may opt to put a few bucks in the cuss jar when things don't fit later, your choice. Once completely satisfied that all is good, epoxy the rails and related 1/2" balsa triangle reinforcements into the wing. Use some 1/2" balsa to fill the rails, flush to the bottom of the wing as per plan detail.

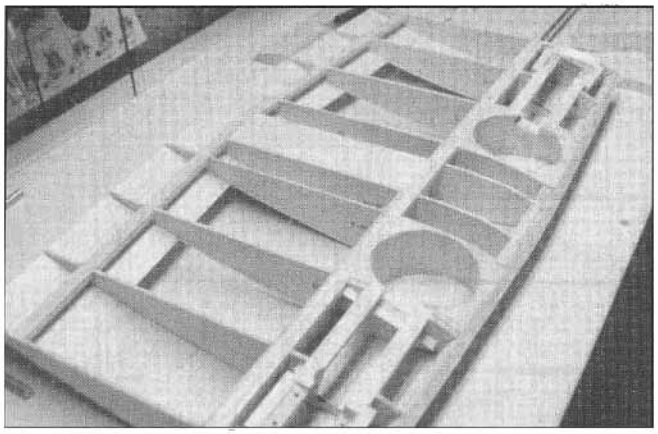
If you're going to use a pushrod system for the ailerons, now is the time to secure the outer pushrod guides, making sure to leave enough of the guides sticking out to go all the way through the outer wing panels. Now, sheet the bottom of the center section with 1/16" balsa, same as the top and capstrip on W3. Again, for the retract crowd; open up the wheel bays/strut area. (**Remember, open**



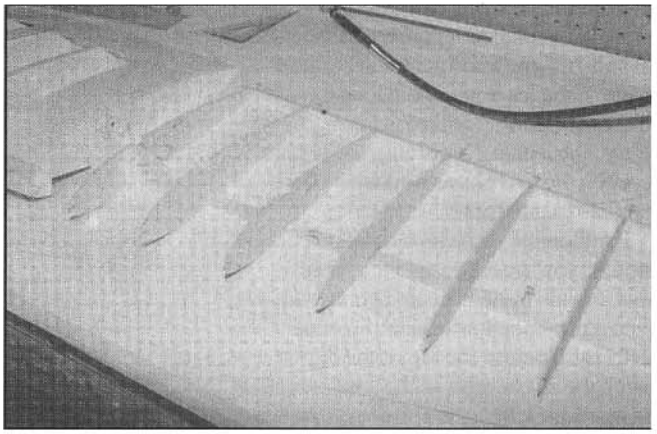
Framed center section of wing.



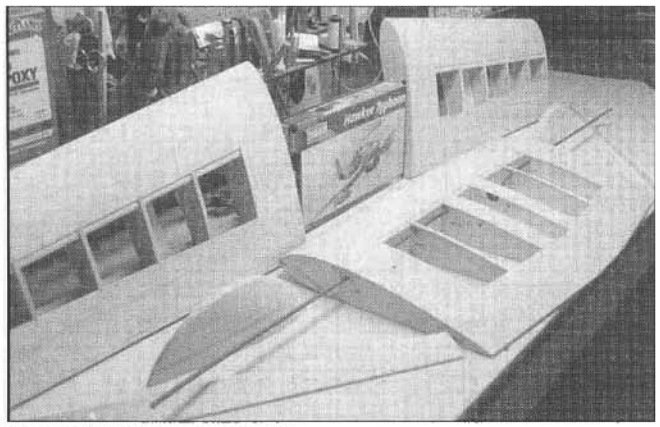
Leading edge reinforcement detail.



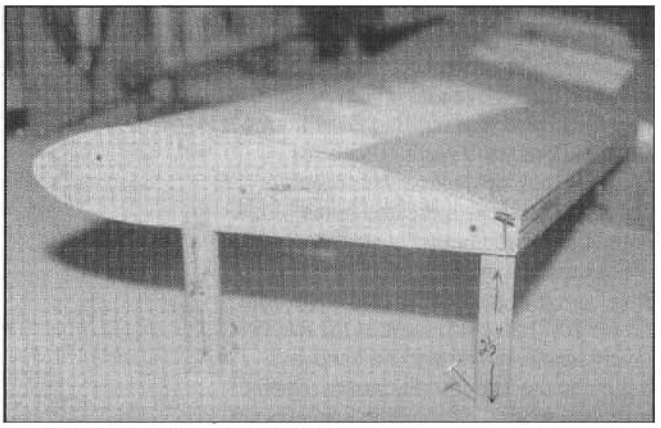
Wheel bay/mount rail detail, prior to bottom sheeting.



Beginnings of outer wing panel.



Completed wing components.

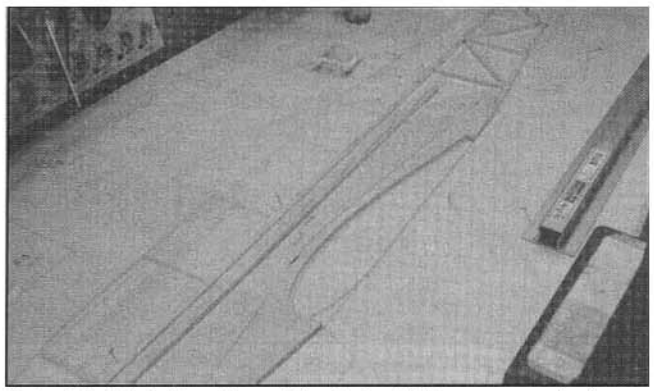


Outer wingtip blocked up 2-1/2".

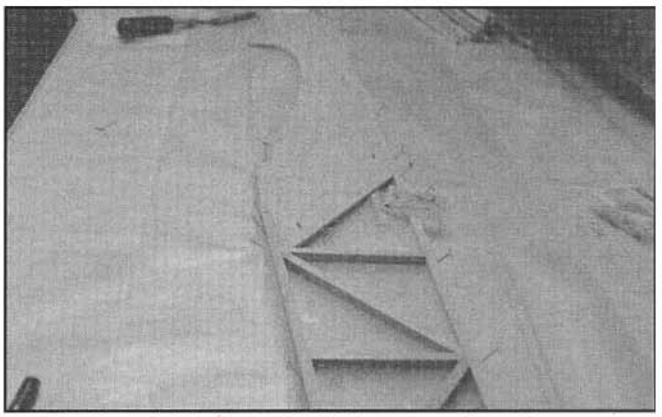
up the bottom only, because I know a dummy who opened up the top of the wheel bays, blushing as I type). Anyway, once you've opened things up, use some medium glass cloth inside the bays on the top 1/16" sheeting to make it a little harder to stick a finger through later on.

Now we can move on to the outer wing panels. We can work on both of these at the same time and we start by pinning down the bottom 1/2" x 1/4" balsa main spars over their correct position on the plans. The end of the ribs butt up against the rear 5/8" x 1/4" spar which I made out of a 1/2" x 1/4" balsa strip with a 1/8" strip of balsa added to the top. Once made, pin it in place on the plans and glue ribs W7 to W12 (leave W6 out for a moment) in their correct position. Glue the 1/2" x 1/4" balsa spar. Fashion a dihedral gauge off the plan from 3/32" balsa and use it to set the correct angle of W6, then glue that one as well. Now, depending on your aileron control choice, add the 1/8" balsa pushrod base between W8 and W9. Add the 3/8" sq. balsa leading edges and accurately cut and glue the 3/32" balsa shear webs between all the ribs. You will notice that the rear spar of the wing panels have to be shaped to conform with the shape of the airfoil/ribs. This is easily done with a long sanding block, so do this now as it's time to sheet the tops. Areas indicated on the plans are now sheeted with 1/16" balsa and capstrips added to ribs W8 to W12. Remove the panels from the plans, sheet and capstrip the remaining bottom of the wing panels the same as the top.

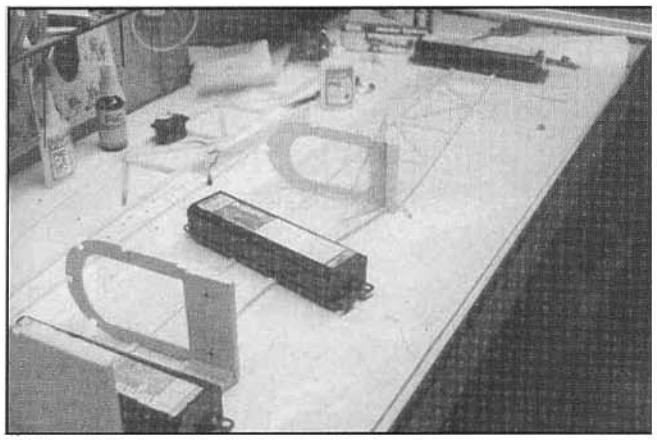
I opted to build the ailerons up, but if you find it easier to make them from solid balsa, then go ahead. For those who build them, start by cutting the bottom of the aileron from 1/16" balsa and mark the rib locations, using the plan as a reference. Pin the bottom to the plans and add the 1/2" x 1/4" to the leading edge of the aileron. Glue the ribs in their proper locations, **remembering** to set the angle of the inboard rib with the dihedral gauge. Add the 1/8" ply control horn mount plate between the correct ribs based on the type of control you decided



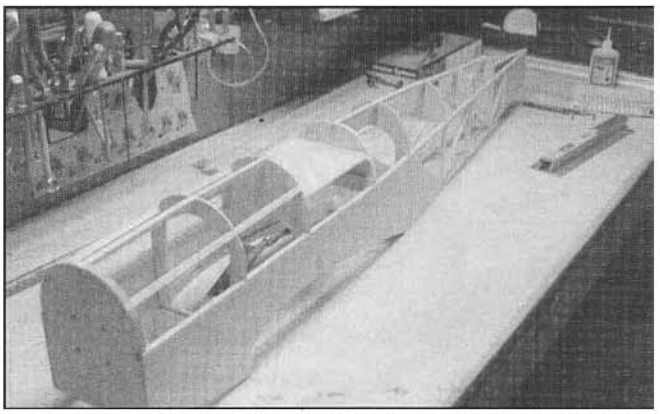
Completed right fuselage side. Note: 1/4" sq. spacer laying on fuse side.



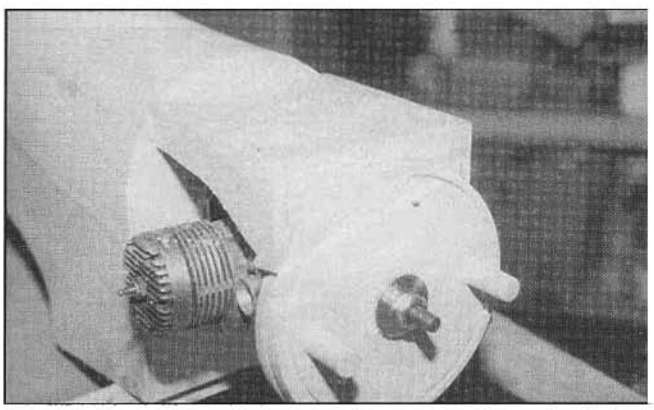
Left fuselage side built on right. Note: spacer location.



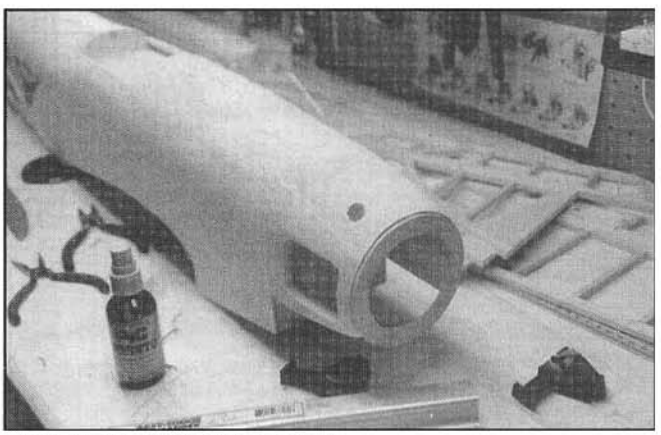
Bulkheads being attached to right side.



Framed fuselage. Note: 3/16" stringers not shown, but added to ease sheeting.



Start of cowl. Note: 1/8" spacer between spinner backplate and F1A.

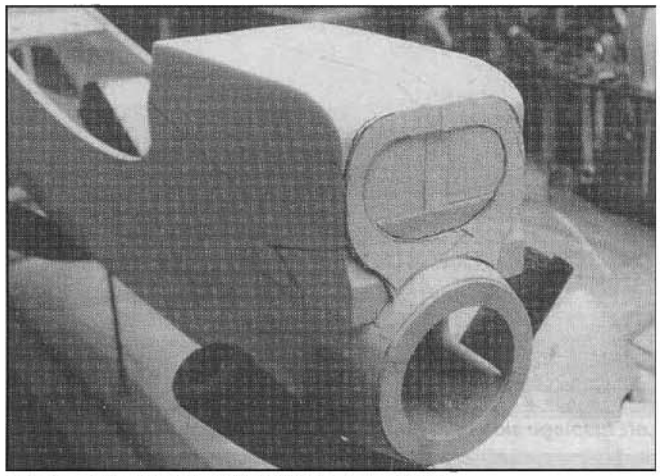


Completed balsa portion of cowl.

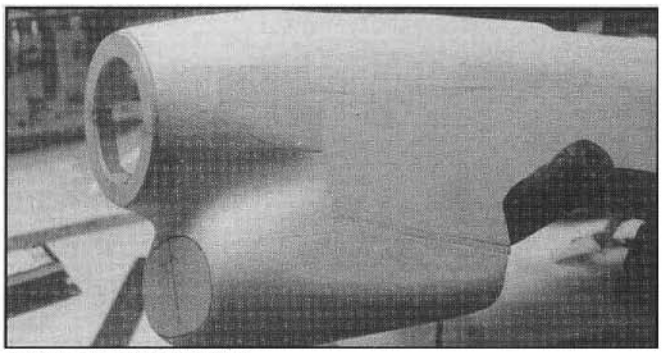
on. Shape the top of the 1/2" x 1/4" leading edge to conform with the airfoil, then glue the 1/16" balsa top in place. Sand the leading edge of the aileron (as per plan detail) to allow proper aileron movement once attached to the wing panels. Trial-fit the ailerons to the panels and fit your chosen hinges, but do not glue in place at this time. (I used G.P. CA hinges on all surfaces.)

Sand the edges flush at W6, where they will mate with W5 of the center wing section. Secure the wing center section back in its position on the plans and check for proper fit of the outer wing panels by blocking the panels up 2-1/2" at W12. This should give the proper dihedral angle to ensure proper mating of W5 and W6. I did not put any dihedral braces in the wing, so spend a little time here to get the fit correct and ensure there are no spaces. Once satisfied with a good fit, epoxy the two outer panels to the center section, blocking the tips 2-1/2" off the table and allow to dry completely. Remove the wing from the table and wrap both joints with 4" wide, medium glass cloth (top and bottom). I used epoxy, thinned with rubbing alcohol, to glue the cloth down. The cloth is necessary to ensure a strong joint with the absence of dihedral braces, so I again stress the importance of a neat, clean job. When dry, lightly sand, fill where needed, and feather the edges of the glass cloth with a light filler of your choice.

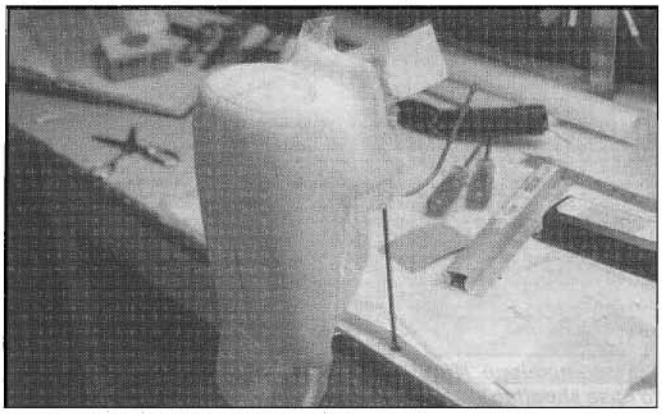
The wingtips are made from a solid 12" x 3" x 2-1/2" piece of balsa. Use the plans to first cut the block in that half-moon shape. Then butt it up against the wingtip and roughly trace out the shape to match the tip (including the aileron). Draw a line (a flexible ruler comes in handy), from the front of the leading edge to the trailing edge and mark secondary lines on 1/8" either side of the centerline. This gives you a 1/4" wide strip that the tip will be tapered down to from W12. You can now use these lines as a guide to carve the wingtip to a rough shape. (A bandsaw sure made short work of this.) Once roughly shaped, glue the tip onto W12. Starting with an 80 grit sanding block, continue to shape the tip and use



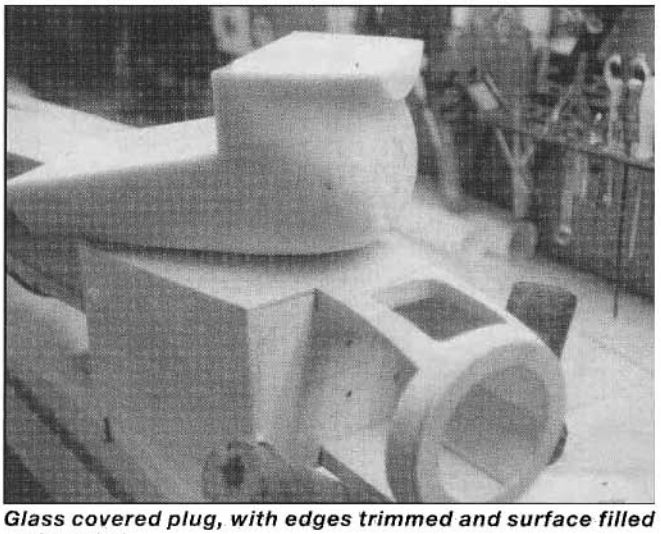
Rough shaped styro plug with front template.



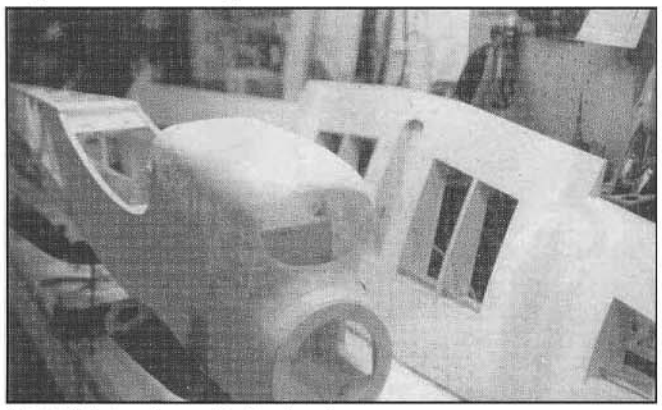
Styro plug after shaping.



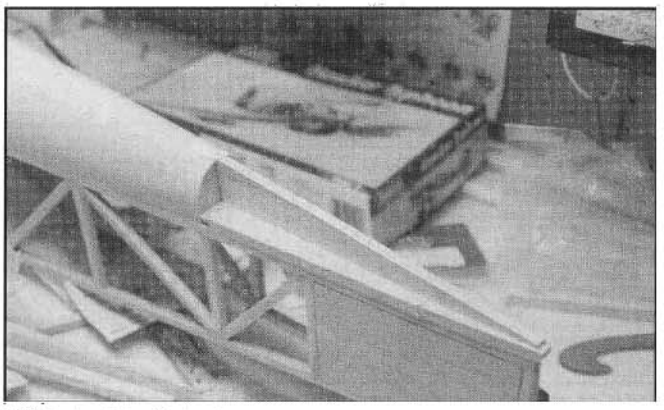
Plug with first coat of glass cloth.



Glass covered plug, with edges trimmed and surface filled and sanded.



Complete cowl mounted to fuselage.



Fillet construction prep.

finer and finer paper until it's nicely blended with the rest of the wing and gently rounded on the tip. Use a long sanding block to round off the leading edge, making every effort to keep the leading edge uniform.

Fuselage:

First, make sure you have all the fuselage parts cut from the proper materials. Glue the 1/8" ply doublers onto the insides of the 1/8" ply sides, **making sure you have made a right and left side** (sorry for yelling). Mark the location of the bulkheads on the **inside of both** fuselage sides. Place the right side on the plans (doubler up) and pin it in place. Glue the 1/4" sq. spruce longeron in place, butted against the top of the fuselage side and pinning the remainder aft of the fuselage side. Glue and pin the bottom 1/4" sq. balsa longeron in place, followed by the 1/4" sq. balsa vertical braces between the longerons. Complete the side by gluing the 1/4" sq. balsa diagonals in place and F11. Note that F11 is the pushrod exit plate and is flush with the outside of the fuselage.

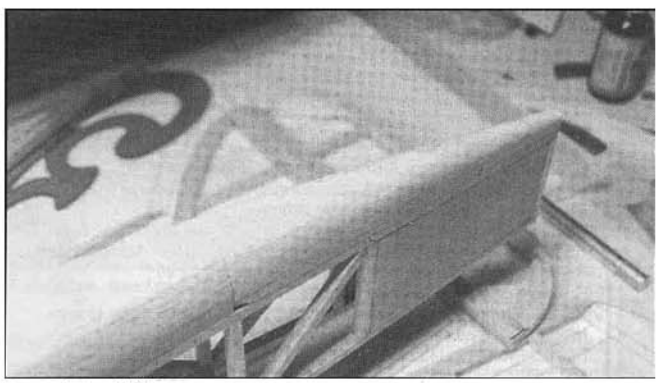
To ensure both sides are the same, the left side will be built over the right, so leave this side secured to the plans and place a layer of wax paper over it. Place a 1/4" sq. stick on the right fuselage side near the top, running the whole length of the side. This will act as a spacer and will compensate for the space made by the 1/8" doublers. Now, pin the left fuselage side directly over the right (doubler down) and complete the left side in the same sequence as the right. (Again, make sure F11 is flush with the outside of the fuselage side.)

Remove the left side. Both sides should be perfectly matched. Leave the right side secured to the plans. Glue F2A to F2, then glue F1, F2, and F5 to the right side at the marked locations, naturally making sure they are 90° to the fuselage side. I added some 1/2" tri. supports to F2 and F5 for some added strength. Use epoxy to glue a 1/2" tri. support on F1, making sure it remains at a right angle to the fuselage side. Once dry, glue the left fuselage side to these bulkheads at their proper location,

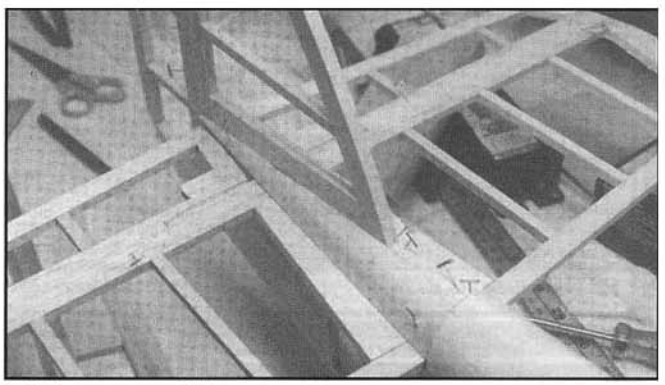
making sure that both sides remain square to each other. Add bulkheads F3 and F4. Taper the rear, inside of the fuselage sides where they will be joined using a coarse sanding block. Pull the ends together, check for proper alignment and fit. When satisfied, glue the ends together. Add the 1/4" sq. balsa cross members, top and bottom between the two sides. Glue the 1/4" tri. cockpit floor supports in their correct position and glue the 1/8" ply cockpit floor in place. Add F6, F7, and F8. Add the top 1/4" balsa stringer between F4 and F8, followed by the three 1/4" sq. spruce stringers between F1 and F3.

Now that we still have plenty of room to work, it's time to drill all the necessary engine mount, throttle control rod, and fuel system holes in F1. The prop shaft of your chosen engine should be aligned smack on the centerline of the plane. Once this is done and all necessary blind nuts, etc., are installed, then add the 3/16" sq. balsa stringers. (Note: I've added the 3/16" stringers since I built mine to assist in a smooth sheeting job.) Epoxy F13, the 1/4" ply wing mount plate, in its proper location, supporting it with the 1/2" triangles as indicated on plans. F12 is then added, which basically gives something for the covering to attach to later on.

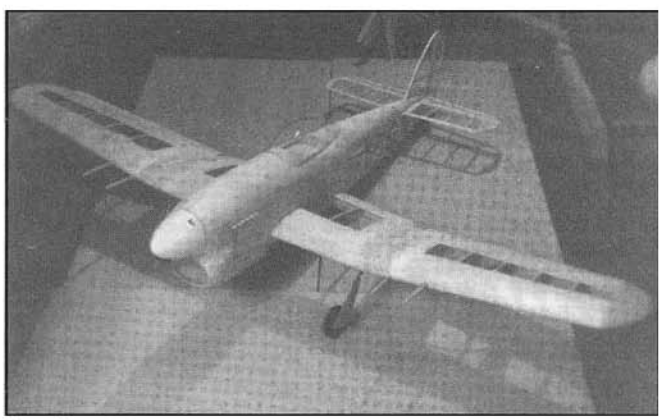
Sheet the top of the fuselage with 1/16" balsa. I made F4 out of 1/4" balsa, as this is where the front sheeting and the turtledeck sheeting meet, thus providing a decent surface to blend the two. Add your 1/4" balsa cockpit sides and sand to



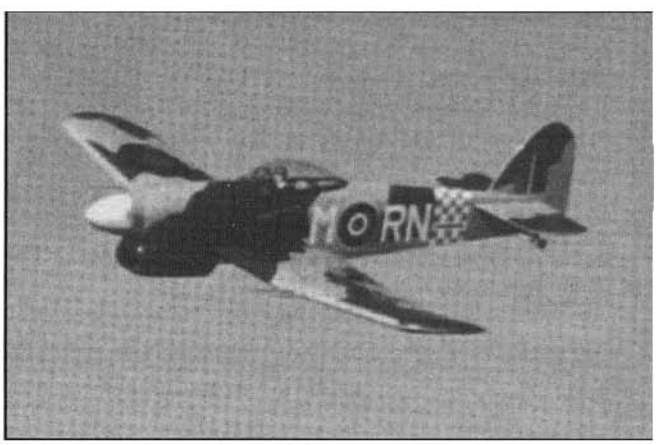
Completed fillets.



Tail features and fillets as a unit.



Bare bones.



From RCModeler Nov. 1999

the contour of the fuselage. I used a ready-made Great Planes P-51 canopy and you can use this to decide how high the sides have to be. You may now want to fuelproof the inside of the fuselage where your fuel tank will be located.

It's time to check the fit of the wing in the fuselage saddle. There should be a little extra room to compensate for some form of padding (I cut standard rubber bands and CA glued them to the saddle; it's quick, easy, and works fine.) When satisfied with the fit, square up the wing on the fuselage, and check by measuring the distance from the wingtips to the center/rear of the fuselage. Both measurements should be identical. It helps to make some reference marks on the wing and fuselage to ease alignment. Hold/secure/tack (whichever you're comfortable with) the wing, and drill the two 5/16" dia. holes through F2A/F2 and through the leading edge of the wing. I used a drill bit extension to assist with this part. Remove the wing and epoxy the 5/16" dia. dowels in the wing. The dowels should extend all the way back into the shear webbing, so be generous with the epoxy to ensure enough makes it to the back. When dry, fit the wing back in the saddle and check again for proper alignment. Secure the wing once again and drill 1/4" holes through the wing at the indicated locations, continuing on through the 1/4" ply F13. Remove the wing and add proper-sized brass threaded inserts or tap F13 to accept the 1/4"-20 nylon wing bolts. Bevel the bottoms of F1 and F2, then cover the bottom area between the two with 1/4" balsa sheet.

Attach the 4" Top Flite spinner to your chosen engine, and mount the engine so the backplate of the spinner is 4-5/8" from F1. Remove the spinner and tack-glue F1A to the backplate of the spinner using 1/8" balsa spacers between the spinner and F1A. A little bit of med. CA works good for this. Add the 1/2" balsa cowl sides, cowl top, and the 1" balsa tri. stock inside the cowl. Remove the spinner and engine, add any needed fill to the outside of the cowl and add the 1/2" piece of balsa to the bottom of F1A. Use a coarse sanding block to contour the cowl from F1 to F1A, continuing to finer grits until smooth.

Chin Cowl:

As far as I'm concerned, making the chin cowl look right makes or breaks the overall looks of this plane and it really is not that hard to do. For those who prefer built-up balsa or are proficient with vacuum-forming, have at it, using the plans and front template as a guide. I, on the other hand, am inherently lazy and used an easy, quick method to make a fiberglass cowl. The idea came from an old article, that I can't find, so here it is in a fibernutshell. I used 2" blue foam to make the plug because you can 5-minute epoxy pieces together and it's easy to cut and shape. First, I jammed a piece lengthwise between F1 and the 1/2" balsa fill on the bottom of F2A. This chunk should be the same width as F1 and butted to the bottom balsa portion of the cowl. Make it fit tight, as it's a perfect way to hold the rest of the plug in place as you piece it together with the advantage of being able to take it in and out. Epoxy necessary pieces to the first chunk to make a block that is the same width as the fuselage and follows the fuselage bottom between F1 and F2. Be careful **not** to glue the foam to the fuselage. Using the plans side view, make a lite cardboard template of the chin cowl profile. Use this template to trace the profile onto the side of your plug. Pop the plug out and cut the profile of the cowl. I used a bandsaw to cut this out and it took about 15 seconds; so, if you don't have one, use a friend's saw for the 15 seconds, cause it doesn't get any easier. Now, stick the plug back in

HAWKER TYPHOON MATERIALS LIST

Balsa Sheets:
6 — 1/6" x 3" x 36"
3 — 1/16" x 4" x 48"
8 — 3/32" x 3" x 36"
1 — 1/8" x 3" x 36"
1 — 1/4" x 3" x 36"
1 — 1/2" x 4" x 36"

Balsa Sticks:
11 — 1/2" x 1/4" x 36"
10 — 1/4" x 1/4" x 36"
2 — 3/8" x 3/8" x 36"
4 — 3/16" x 3/16" x 36

Spruce Sticks:
3 — 1/4" x 1/4" x 48"

Balsa Blocks:
2 — 3/4" x 11/2" x 8"
2 — 12" x 3" x 2"

Balsa Triangle Stock:
1 — 1/4" x 36"
1 — 1" x 36"
1 — 1/2" x 36"
1 — 3/4" x 36"

Aircraft Grade Ply:
1 — 1/4" x 6" x 12"
1 — 1/16" x 3" x 6"
1 — 1/8" x 12" x 48"

Lite Ply:
2 — 1/8" x 12" x48"

Hardwood:
1 — 3/8" x 12" Dowel
1 — 5/16" x 10" Dowel
1 — 1/4" x 12" Dowel
2 — 3/8" Landing Gear Blocks with 3/16" groove (Fixed Gear)

Miscellaneous:
Great Planes P51 Canopy
4" Top Flite P51 Spinner
3/16" Music Wire
1" Tail Wheel
Goldberg Tail Wheel Bracket
2-3/4" Wheels (retracts), 3-1/2" (fixed)

the fuselage, make the front template and position it on the front of the plug, just under the spinner.

Trace the outline and the cowl opening onto the plug. Remove the template and start by rounding the bottom corners back to the wing saddle to match the template markings. Carve and sand the contoured area under the spinner where the plug meets the balsa portion of the cowl. A large dowel wrapped with various grits of sandpaper works good here. Round the edges around the marking for the inlet, but don't sand marking for the inlet off, as you will use it as a guide to cut the opening after glassing. Fine-sand it to your satisfaction and pop the plug out. Taper all the edges that will mate with the fuselage approximately 1/16" to account for the thickness of the glass.

Get some med. weight glass cloth and cut a bunch of squares from 1" to 3" square with a few extra small and extra large ones. (It really is a pain to try and cut more pieces while your hands are covered with epoxy, so have extra of varying sizes handy.) Make enough to cover the plug a couple/three times and stick the plug on some sort of pedestal. I used 30-minute epoxy, thinned with rubbing alcohol to a consistency of standard wood glue or thereabouts. Put on some surgical type gloves and start with the larger pieces, working from the back to the front. The smaller pieces are needed at the front where the contours are more complex. Soak the pieces in your epoxy mix and lay them on, overlapping each piece with the next. Get the first layer on and let it dry, then put a second on. I only used two layers, but will use three next time around. Mine has held up well, but the third layer would make it that much more durable.

When your final layer is dry, cut all the excess cloth off and sand the edges nice and smooth. Carefully cut out the cowl inlet using your marking which is still visible through the cloth. Test the fit once again. Fill in the cloth weave with some filler or epoxy mixed with talc so you have a nice smooth surface. If all is good, get a can of "acetone" and go outside to a very well ventilated area. Pour the acetone onto the foam until it's all dissolved. TADA! Clean up the inside and there you have it. It really isn't that difficult to do.

Add the 1/4" ply cowl mounts and 1/4" tri-stock reinforcements where indicated, inset to compensate for cowl thickness. Position the cowl in its place and drill appropriate sized holes through the cowl and mounts to match the size of the metal screw used.

Tail Feathers:

The tail surfaces are straightforward, made from 1/2" x 1/4", 1/4" sq. and 1/4" sheet balsa. Use the plans to shape R1 (vertical fin leading edge) and the rounded edge pieces from the 1/4" sheet balsa. A 1/4" dowel is epoxied between the two elevator halves. Taper the elevator halves and rudder down to 1/8" at the trailing edges and round the leading edges of the vertical fin and horizontal stabilizer. Bevel the leading edges of the rudder and elevator halves to allow proper movement of their surfaces once hinged. Depending on your favorite mode of hinging, you may want to hinge these surfaces now. Again, I used G.P. CA hinges and permanently mounted them at this time. I then covered them as a single unit, thus eliminating the hinge gaps.

To make the fillets, I tack-glued 1/4" balsa of appropriate size to the fuselage where the elevator and rudder will be attached. Next, I tacked the balsa in place that will be shaped into the fillets and carved and sanded to the shape and contour of the fuselage. Remove the unit from the fuselage and pop the finished fillets out.

Tail Wheel:

The plan shows a simple method for attachment of the tail wheel using a modified tail wheel bracket. It doesn't get much simpler and, this way, the stress on the rudder hinges from those bumpy runways is minimal. Add the outer sleeves of the control rods of your choice for the rudder and elevator control.

Details:

The plans detail how I made the dummy exhaust stacks, fake cannons, and gear door covers. These are simple and don't take long to do, but they add much to the overall appearance.

Final Assembly:

Final-sand the entire fuselage, wing, and tail surfaces, filling where needed. Work out your radio installation, fuel tank set-up, etc. There is tons of room in the fuselage for any type of gear. Use some thinned epoxy to fuelproof the inside of your engine compartment. Test-fit everything together and make minor adjustments where needed. For covering, I used MonoKote and have since noticed that Top Flite now offers the colors I used in a "flat" finish which would be ideal. I covered the tail feathers before I attached them, which I find easier. Once the tail has been secured, you'll have to add a piece of 1/4" balsa fill between the leading edge of the vertical fin and the back of F8. On mine, I first covered the plane entirely with "Dove Grey" MonoKote, then made some paper templates for the camouflage. You can use the scale 3-views on the plans as a guide. I used the paper templates to cut the "Olive Drab" camouflage pattern, and to mark their locations on the plane itself, I used a water based marker. To avoid all the air bubbles, I used a "Woodpecker" tool which punctures hundreds of tiny holes in the grey base covering where the olive drab will be applied. Place your camouflage sections of olive drab in their proper location and use the minimal heat required, working from the center area to the outside edges. The roundels, invasion stripes, lettering, etc., were all cut from appropriate colors of iron-on film. The cowl was painted with matching Top Flite spray paints. Glue the exhaust stacks and wing cannons in their respective position and put her all together.

Balance where indicated on the plans and set your control throws. She's now ready to provide some "close support" to the boys on the ground.

Flying:

I did not design this to be an Extra, so I don't recommend spending much effort trying snap roll type maneuvers, but loops, rolls, Immelmanns, hammerheads, inverted flight, spins, and all that great warbird-like stuff is as easy as your faithful Sunday sport plane. Take-offs are straightforward (pun intended). A little rudder is needed to keep her straight. If you jam the power on, she'll break ground in a few feet, or you can make a nice, gentle, long scale run with minimal throttle.

When landing, don't be afraid to slow it down, or she'll float by at walking speed. I like to set up on a long, flat final, putting her on the mains and waiting for the tail to sit.

It's not easy to stall, it just kind of mushes along and I've been able to pretty much bring it to a standstill with a decent headwind. My favorite is probably the easiest. A long arcing, descending turn, bringing it down the middle of the runway, full throttle, a few feet off the ground. There is nothing better than a warbird on a low strafing run ... for a split second you're inside the cockpit, bearing down on that bunker ... man! I do love this hobby/sport.

Anyway, reality check. If you want an easy to fly bird that gets as much attention in the air as it does on the ground, build yourself a Typhoon!

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