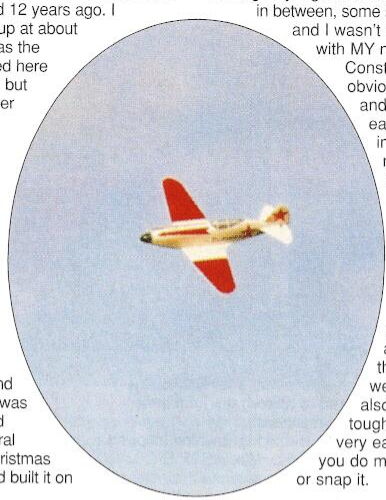
MIG 3

John Rutter presents his all-sheet fighter for small diesel/glow power...

John's Mig 3 sits next to his venerable Spit (8 years old!), during early test flights (fuselage lettering still to be done).

I first looked at this design as a suitable model around 12 years ago. I even drew it up at about the same size as the model presented here for foam wings, but somehow I never quite liked it enough. Time and technology march on though, so when I discovered that I could "tile" any drawing to any size and print it out from my computer, I had another look at the MiG. The end result of all this was that I traced and drew up structural drawings on Christmas Eve of 1997 and built it on Boxing Day! I got a bit diverted on the day in between, some sort of family day and I wasn't allowed to play with MY new toy!



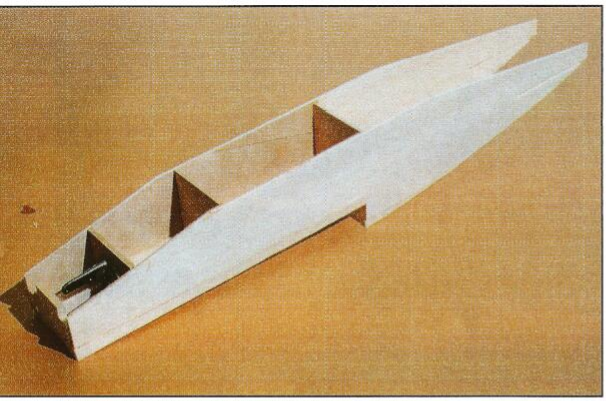
Construction is obviously very quick and mostly very easy, though I can imagine some readers looking dubiously at the all - sheet wing. If you choose the right grade of wood it really isn't all that heavy and I've yet to have an all sheet wing that didn't work well in the air. It is also incredibly tough as well as very easy to repair, if you do manage to dent or snap it.

Flying the Mig

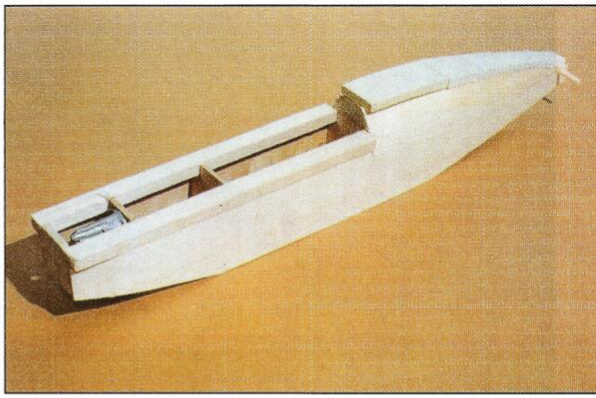
First - the best bit! How does it go? The answer has to be very well. My PAW 2.49 is a bit feeble (getting a bit "tired" perhaps) but still with enough power for much greater than scale speed and as this model at around 2lbs is 8oz lighter than my Spitfire, the climb is still good. Anyway, you can still buy a PAW 2.49 in various versions. As regards control throws, I found that 10mm is more than enough on the ailerons for very rapid rolling (rates off) and 6mm is smoother (rates on). In similar fashion the initial 15mm of elevator throw was reduced to 10mm each way - this is still more than enough for very tight turns, especially if the CG comes out a bit aft of the one shown.

My first flights were on a typical Hartlepool calm day, it was almost dark (at midday) with overcast and raining! I could actually have done with a bit of breeze to give the model a head start, as I found it has a tendancy to drop from a less than good hand launch in calm conditions. I'd recommend having a helper launch for you - I don't usually have that luxury! A nice bendy nylon propeller is also useful, it's far less likely to snap on contact with the ground than a glass filled one.

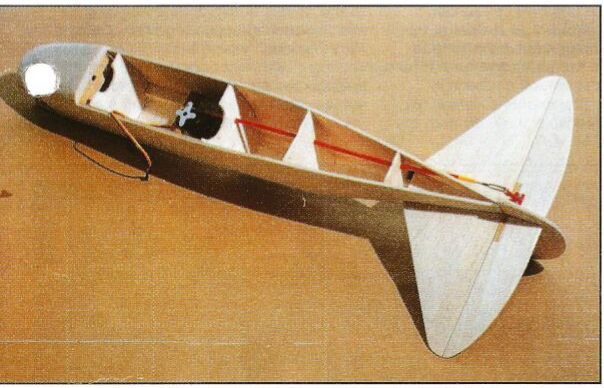
Once in the air the model quickly settles into a brisk climb and is quite stable in between manoeuvres. I've flown it in very blustery conditions that have grounded other models but the MiG remains pretty steady. Roll rate is higher than a lot of sports models, dependant on the throws of course, and the 'bank and yaw' turn rate would bring tears to the eyes to the pilot of a real plane. The early flights with loads of elevator throw showed that the model can drop a wing if you are violent with the elevator, so I took it home, reduced the throws to those mentioned and carved a bit more washout into the wings! The model is capable of any 2 channel manoeuvre I can think of, although of course, constant inverted is impossible without a clunk tank. Rolling the model inverted and holding it there (it only takes a modest amount of down to keep the nose up) is a good safety feature in my opinion, as it gives you a chance of stopping the motor - you can't do this with a clunk tank. Perhaps the most enjoyable manoeuvres are those that involve a half roll to dive past in a low turning pass followed by a rolling climb out - it looks very realistic, if smoothly



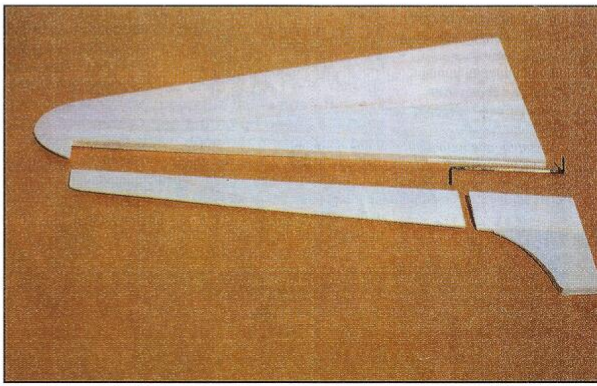
Basic box fuselage before sheeting and block carving.



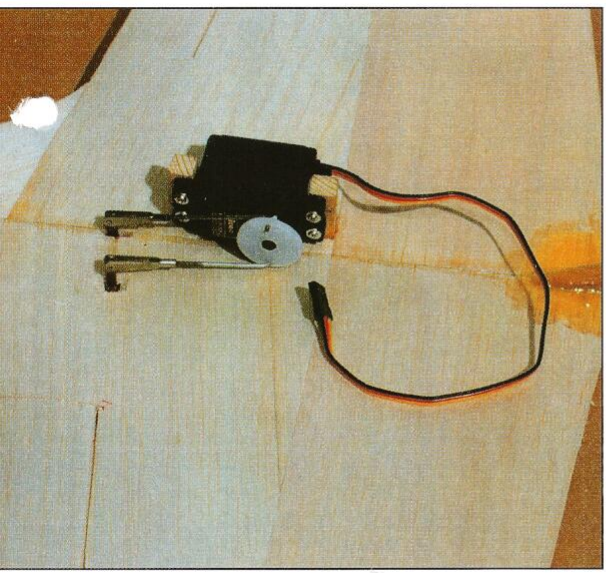
The dorsal spine has been added and the top blocks in place. Note the top keel strips.



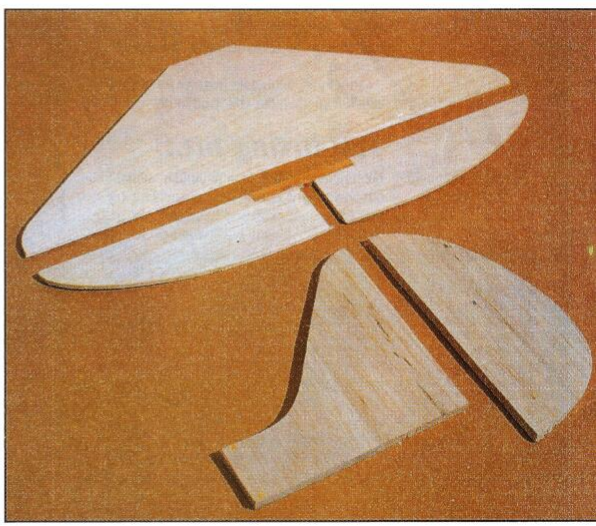
The fuselage pretty well complete (leave bottom sheeting off to fix radio installation).



The wing components laid out. Note the grain directions of the two piece main panel and the grooved trailing edge, for the torque tube assembly. Note also that the wing fairing piece forms part of the wing and is drilled at a later stage for the wing bolts.



The aileron servo set-up. The locating dowel and aileron mounting blocks go right through the wing and are sanded flush with the lower surface.



The tail is simple sheet with rounded edges and a hardwood elevator joiner.

The sleek lines of the Mig 3 lends itself well to any number of colour schemes - keep visibility in mind, though - these little models can disappear quickly! Simple detailing and painted cockpit give the right 'look'.

done. The glide is fast and quite flat but the model isn't a glider so I usually make sure I have a bit of height when the motor starts to splutter (the PAW is quite considerate like that - some just cut dead) and keep the speed up on the approach, gradually easing the nose up as the speed drops. Landing is quite smooth and accurate with a bit of practice. The model has a tendancy to drop a wing at the stall (- I've seen far worse though), so try not to drag it out too much or be too violent with the controls in the glide - it's better to walk for the model than wreck it trying to get it on the strip. Flight under very slow throttle conditions seems to involve a bit of up elevator to keep the nose from dropping, so a throttled version might need a touch of down thrust built in. How do I know this with an unthrottled diesel? Well, as anyone with a diesel knows, they are prone to "running back' the compression screw, which has the effect of slowing the motor down - the PAW will do this on occasion, leaving me to pootle around to a "throttled" landing!

Only one problem presented itself on flying, getting the photo's!

The lifting bit...

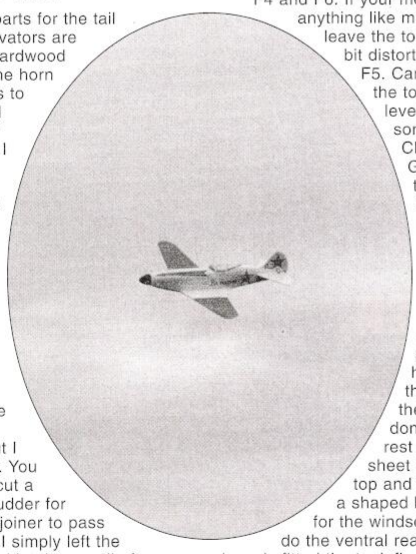
Construction begins with the wing. Choose light grades of wood but try not to go too soft for the rear sheet in particular, as you want reasonably spongy material for the ailerons. Cut out the shapes as shown in the photo, noting grain direction. The forward section runs from root to tip straight across, but the rear section follows the line of the trailing edge to keep the ailerons stiff. I forgot to include the trailing edge fairings in the 'bits of wings' photo, but the grain for this follows the line between the outer trailing edge join and the fuselage side. Glue the bits for each panel together (being a quick build type of model I used medium cyano for this). Don't round off the tips yet. Decide which is port and starboard and mark them - you don't want two the same. Use a razor plane to form the washout under each tip. Don't omit this, it looks a bit radical at this stage, but helps the whole thing to work well in the air and when the rest of the wing is done it's hardly noticeable. Check one wing against the other to ensure they are both the same, this is easily done by butting the two trailing edges together and is why you don't shape the tips until later on. With razor plane and glasspaper again, form the leading edge - it's just a case of taking a bit more off the top than the bottom but

John's eldest son James gives scale to the Mig, against a busy Hartlepool skyline.

don't go too thin or it will get damaged too easily. Carefully shape the rest of the trailing edge. This gets a bit tricky around the trailing edge fairing but still isn't that hard to do. I left mine about 90% done and did the finishing when the model was complete. Sand the centre line to the dihedral angle and glue with either epoxy or thick cyano, using a block of scrap to hold to the dihedral angle. Shape the tips, keeping the washout all the way to the tip. Mark off and cut away the ailerons including the inboard section, to the centre line. Use sharpened tubing to make a groove in the rear of the wing and the front of the fairing to suit the aileron torque rod tubes and glue the assembly together. I DON'T use cyano for this as it's too easy to glue the lot up solid - I used good old balsa cement, but PVA would do. Put a servo on a couple of wood blocks and fit to the wing. Make up the pushrods and test fit. Ailerons are centre hinged with myiar strips and the assembly can be fitted dry and tested if desired. Drill a hole in the front of the wing for the retaining dowel (I used a sharpened brass tube rather than a drill bit) and glue in place. Reinforce with epoxy and nylon, or glassfibre. You could reinforce the centre join with PVA soaked nylon at this point but I didn't bother, as the join was already extremely solid.

Simple tail

Cut out the parts for the tail end. The elevators are joined with hardwood or pine, as the horn only attaches to one side and hinging is by mylar again. I simply rounded off the front and back of the tail with no effort at a proper section. There is room in the fuselage for a rudder servo if you want to make the rudder functional but I didn't bother. You will have to cut a hole in the rudder for the elevator joiner to pass through and I simply left the rudder pinned in place until after painting the primer and final assembly.



Coaxing the curves...

Now for the fuselage. As the fuselage has to bend-in considerably at the top rear, the actual cutting line is wider than it would appear on the side view, hence the dashed 'cut to this line' on the drawing. Cut out all the formers from the appropriate material and make sure you don't use anything hard for the fuselage sides as they have to do that bit of 3D bending later on. I reinforced the sides towards the front with thin (1/32") ply, held in place with contact adhesive. Now, the fuselage is built a bit differently from most, in that it uses the 2 pieces of 3/4" x 1/2" as a crutch, around which everything else is assembled. Glue formers F1a, F2 (with motor mount attached), F3 and F4 to the crutch inverted over the plan. I removed the top part of F4 temporarily. Make sure everything is square, of course, and when set glue the formers to a fuselage side, making sure that the re-attached piece of F4 can be in contact with the sides. Glue the straight bits of the sides to the crutch too. Add the other side in the same way and when set pull in the nose to touch F1a. Use thin cyano and activator to avoid hanging on to it for ages. Pull in the tail over a straight line marked on the board or plan, and glue. Attach F5 and F6. Now comes the tricky bit. Wet the top half of the fuselage inside and out, and let it soak a minute or two. Using thin cyano and activator (- you might need assistance with this bit) pull in the top of the fuselage at F5 and attach to the fuselage sides. Do the same with F4 and F6. If your model is anything like mine, this will leave the top looking a bit distorted behind F5. Carefully plane the top edges level and glue some 3/8" CROSS GRAINED to the top of the fuselage, pulling in the distortion as you do so. Again you might need two pairs of hands to do this. That's the hard bit done. Add the rest of the 1/2" sheet for the nose top and bottom and a shaped bit of wood for the windscreen. Don't do the ventral rear sheet yet. I loosely fitted the tank floor in place at this point and glued F2a in place. Cut out roughly the area for the engine to fit into and put the engine in place. Shape the sheeting, the spinner can be used as a guide for the nose shape, and dry fit the fin. Make sure the fin is vertical of course, glue the tail in place checking that it's square in all directions and glue the fin to it and the fuselage. Fit another servo to a couple of rails that fit across the fuselage and glue them in place high up and near to F4. I put mine in the middle but there is room for another easily and even a third at a squeeze with standard servos, so that you could have 4ch gear on the model if you wanted - throttle in particular might be nice. Put a drop of paint or similar on the front of the wing dowel and slide it into contact with F2a. This tells you where to drill a hole. I drilled 5mm and then reamed the hole out to be a snug fit on the 6mm (1/4") dowel with a prop reamer. Tack glue the wing retaining plate in place and put the wing on. Drill through the wing and plate, remove the plate and fit a 2BA blind nut; I squeezed it in a vice for a tight fit and glued it with cyano, too! Refit the plate. Fit the wing and glue the rear ventral sheeting in place to suit. Shape the sheeting and make sure that the underside sheeting ail fits nicely with the wing. Cut the top sheeting to make a hatch for the tank and glue the loose floor in place. There's enough room to fit a 4oz tank but that's far too big for a diesel, so I actually fitted a small 1oz tin tank. Once set up properly, these are usually maintenance free for the life of the model, so the hatch was tack glued in place after trimming flights so I didn't have to worry about hatch releases! The PAW runs for around 5 to 8 minutes on this size of tank which is enough for me.

Detailing and finishing

That's the main construction done, other details can be added such as air intakes and exhaust on the port side. I didn't bother myself, as I liked the smooth clean lines - details like this are pretty much invisible when the model is passing you at speed. I also left off the ventral details including the radiator, as they are too vulnerable to damage on landing. I did think hard about doing the wing/fuselage fillet, this can look very good on this sort of model - I've shown it's approximate line on the drawing, but I didn't do it in the end.

As I intended to use a diesel (PAW 2.49) I finished my model in traditional manner by covering it all with lightweight tissue and dope followed by cellulose primer and paint. I finished all the loose bits up to the final primer stage before final assembly, following this by sprayed on the gloss coats with all parts glued in place. The "canopy" is painted on, as are the stars and arrows, with Humbrol, but the lettering was done with a sticker-cutting machine. I'm afraid I couldn't get the exact Cyrilic font on my computer so I used letters that looked like those needed. This may well represent a gross spelling error in Russian or even something very rude, for all I know. Apologies to anyone who can understand Russian if I got it wrong! **RM**