23" F4- PHANTOM

So the F4 Phantom is the final offering in the mini jet series that we have for you at present.

As I have mentioned before in previous issues, there will be a couple of new mini jets to follow on from the Phantom, but as yet, no dates have been agreed. However, don't despair, they will appear soon enough starting with the EE Lightning and the finishing with the BAC Hawk.

Following on from the single fan designs, some twin 50mm EDF models are in the testing stage at the moment stating with a TSR-2 and followed by the A-10 Thunderbolt.

All of these new mini jets have been tested using the 3S FMS fan unit which gives around 600g of thrust. With these cheap EDF units, economy servos, 30C lipos and 40amp speed controller, it really is maximum fun for minimal bucks.

A few builders of the Gnat and Hunter have gone with the 4S FMS and the 4S PowerFun fan unit (available from 4-max.co.uk)……these units will give another 100g or so thrust over the 3S versions. There really isn't a down side to installing a 4S fan unit except the ESC may be a little bigger and the batteries will not be the ubiquitous 3S 2200mah, which most modellers will have kicking around their workshop in their droves ……For the 4S fan units, you will need an 1800mah 4S lipo pack or something similar. These models are quite small so the key here is to avoid adding too much weight when moving up to a 4S setup….

As we have already launched the Phantom on the www.TonyNijhuisDesigns.co.uk website, I have a good feeling this model is going to be just as successful as the previous three models.

To assist the builder, I have once again made available a canopy and to complete the package, a CNC/wood pack is also available for those who wish to make the building process a little easier and quicker. These parts will ONLY be available though www.TonyNijhuisDesigns.co.uk (TND) and not Myhobbystores. The plan itself will only be available in this edition of the magazine with future copies again only being available again through www.TonyNijhuisDesigns.co.uk.

A few other points to note, the FMS fan units can be sourced from 4-max.co.uk in the UK. The battery was a 3S-2200mah 30c Lipo and servos were cheap and cheerfully 6g 0.85kg/cm torque nano servos. For the ESC, buy a cheap 40amp 3S units as it will be lighter and hopefully have none of these unnecessary programming feature…..you want a simple switch on and go.

Lastly and possibly the most important, a photographic build log is available as a free download to print out from www.TonyNijhuisDesigns.co.uk. These photos will be invaluable and I would suggest downloading these so you can familiarise yourself with the build before you start.

Wings

The wing parts are made from 6.5mm (¼") medium density balsa sheet and each wing panel is made of 3 parts. Weight the individual parts and interchange them in order to achieve an equal balanced wing. Now glue the wing parts together to form a left and right hand panel. Note that the wing tips should only be tack-glued on as these will need to be removed later.

Where indicated on the plan, highlight, using a pen, the location of the area of balsa to be profiled. An indicative guide to shaping the wing is shown on the plan. With the wing panels flat on the building board use a razor plane to profile the wing panels to the first stage of completion as shown on the plan. Now either continue with a plane or with a sanding block, begin the second stage of profiling. Now turn the wing over and repeat the process exactly so the wing is fully symmetrical. Use one of the fuselage sides to make sure the profile is correct at the wing root. When happy, use a medium grade abrasive paper to finish both wings panels to a smooth flowing profile.

The wing tips can now be removed.

Now cut out the ailerons remembering to mark which one fits to which wing. You may have gathered that as the wings are shaped fully symmetrical, it doesn't matter which one is the left or right.

The wings can now be joints together and the 3mm birch ply wing spar fitted.

Chamfer the tips to create the correct dihedral and fit the dihedral spar into the wings. Now glue into position the wing tips

To finish use fine abrasive paper to round off the leading edge and the wing tips and the wings are done!

Fuselage

Begin cutting out the inner and outer fuselage side pieces 13, 14 and all formers 7 through to 15. Note that the elevator tubes holes, should be drilled into former 8 as shown on the plan.

Mark the location of the formers onto the left and right hand side of each fuselage side. Add strips of 9.5mm triangle along the top and bottom edge of the fuselage 14, between former 8 & 9, as shown on the plan.

Now add 9.5mm triangle to the top and bottom edge of fuselage side 13. The length between former 10 & 12 will require some saw cuts at regular intervals to allow the triangle to easily follow the tight curved edge of the fuselage.

Now fit the formers 7 & 8/8A to one side of the fuselage 14. You will note that former 8A is slotted into former 8 to create the fan mounting former. Former 8A should only be tack glued into 8 to give easier access should the fan ever need replacing.

Before gluing 8/8A into position, check that the fan fits correctly through the hole. For the 50mm PowerFun EDF unit, the opening in the former will have to be opened up very slightly.

Now fit the other fuselage side and add the remaining former 9.

On the underside edge of 14, mark the leading edge of the wings. Then cross sheet a piece of 5mm balsa forward of this mark to secure the sides of 14. You will note that the sides of 14 'splay' out slightly forward of former 7. To strengthen the joint between 14 and the bottom sheeting, glue a short length of 9.5mm triangle to each side.

The inner fuselage sides 13, can now be added. This is glued to the top of former 7, 8 & 9 and to the bottom sheeting. Note, use former 15 to check the gap between 13 & 14 is correct at former 15 position.

Now add formers 10 & 12 at the front and former 11 to the rear.

The 2 No. former 15, can be added.

Now make up the thrust tube while the fan unit is out of the model….. I have shown on the plan a cut outline of the thrust tube, before it is rolled. The tube is made from 140micron thick acetate. You will be able to source A4 sheet of this on EBAY or from a stationary's….it basically the thin clear plastic used on report covers etc. The easiest way to make the tube is to roll the end of the acetate around the fan unit as tight as you can making it as a straight tube. Then secure with a small piece of scotch tape across the joint, at the fan.

The fan should now be installed with the wiring exiting sideways in front of the access hole in former 8. I used a couple of dobs of hot glue to secure the fan; its all that's needed.

Now slide the rolled tube in from the rear of former 9. You will have to fold the tube in on itself but as it slides through, it should pop round again. Gently ease the tube over the fan unit by 12mm or so making sure the motor wires are exiting smoothly through the slot you have made in the tube. If you have positioned the wiring slot correctly, the tube seam should run along the bottom of the fuselage.

Finally run a piece of tape along the joint length, making sure the tube is pressed hard against the inside edge of former 9. Use a couple of dobs of hot glue; one on the top and one on the bottom to secure the thrust tube to the fan casing and two 'dobs' against former 9… again it doesn't need any more glue than that!

I would suggest at this point you loosely fit the ESC and check the fan motor rotation is okay.

Now install the elevator control cable outers. I would suggest using the 3mm orange tubes from SLEC ltd and used 20swg piano wire for the pushrod.

Now make up the rolled fuselage side pieces from 1.6mm soft balsa and fit this between former 9 and 15. You will need to wet the outer surface slightly to aid bending.

Now sheet the top and bottom fuselage with 5mm and add the air intake top blocks

Now for the 'shaping' exercise so make sure your razor plane has a new blade in it….

Please remember that there is a lot of shaping around the nose and the triangle balsa is there to be cut into to create the smooth radius curves of the Phantom, so don't scrimp on the shaping. So use a razor plane to profile the square edges of the fuselage and then progress on to using a sanding block along the complete length of the fuselage.

Use the former profile shown on the plan to gauge the correct profile of the fuselage along its length.

Now make up the nose & tail blocks using laminates of 12.5mm balsa or scrap 6.5mm balsa from the sheet wing stock.

Make sure you cut to the side profile of the nose and tail blocks as shown on the plan and glue these on to 12 and 11 respectively.

Mark out the fin slot and cut this out in the top sheeting.

The fuselage access hatch can now be marked and cut out. Use a small hacksaw blade to cut through the top sheeting to the depth shown on the plans. Then, using a straight edge, cut through the side sheeting on each side to release the hatch.

To retain this hatch I used one of the small brass spring catches from SLEC at the rear of the hatch and a plywood locating tongue at the front, as shown on the plans.

Fin & Tailplane

To make up the fin, use parts 19 to 20 and glue them together. Profile the fin leading edge. Put the fin aside and only glues into position once the model is nearing completion.

Now make up the tailplane using parts 16, 17 & 18. Round off the tailplane leading edge and chamfer the elevator 17 leading edge ready for the hinges to be fitted.

Finishing off

The wings can now be glued into position.

The tailplane halves and fin can now be glued into position. Use the template shown on the plan to give the correct anhedral.

The sacrificial former 15 can now be 'forcibly' removed from inside the air intakes and discarded. Using a ½" piece of tube wrapped with sandpaper as a profiling tool and profile the corner triangle of the intakes so the intake lip is parallel all the way round, as shown on the plan.

Now mark out the locations of the aileron servos and 'sink' these into the fuselage sides, under the wing.

The finally and most important of all is the large cheat air intake hole in the underside of the fuselage. Make sure you chamfer and smooth the entry leading edge of the opening and don't be tempted to reduce the size of the opening. It needs to be the size shown on the plan as a minimum.

To aid launching the model, make up a launch grip from two laminates of 12.5mm balsa.

Covering

The prototype was covered using light grey Oracover from J Perkins. The insignias, lettering/danger signs decals were supplied by www.becc.co.uk (found on Ebay)

Fit all the control surfaces with flat flock hinges (from SLEC) and secured with glue. Fit all the servos and the all the control horns. For the control horns, I made these out of 1mm birch ply and slotted these into the control surfaces.

The C of G position should be achieved with just the positioning of a 3S 2200mah lipo. Do not be tempted to move the C of G back from the stated position!

The battery was secure using self-adhesive Velcro..

The canopy can either be fitted before or after covering. I prefer to detail the cock pit, fit the canopy and then cover the model around the canopy, but it's up to you. Finding a couple of small 1/15th scale pilots will be difficult, so if you are not having any luck, ask Real Pilots to make you some 3D printed ones.

Flying

The first thing to note with these mini jets, is the wing loading is quite low; only 22oz/sq' so hand launching them is very easy. You will need a firm throw and make sure it is straight and level. I suggest for its maiden flight you get a trusted helper to launch the model for you. The model is remarkable strong and if you don't get it away first time, she'll survive.

Once the hand launch is mastered and trimmed for flight, the model will get away with little fuss and very little control input. On calmer days, except to put in a touch of elevator a second or so after hand launching.

When you get the model airborne and assuming you have cut in the fan breather holes, you will notice how nippy the model is. Once the initial climb out has been executed and the model is fully trimmed out, you can easily pull back the throttle to half stick position and enjoy what is a very scale flying performance.

You'll find the model flies very smoothly especially on a calm day. However if you fly on a windy day, the model will be chucked around a bit so be prepared to fly with more throttle.

Out of all the mini jets, the Phantom is possibly the best looking model out of the range so far, but I think the performance doesn't quite match the sparkle you get from the Hunter, Gnat or Provost…..well, you have to have a favourite don't you! .

The little 3S 11 bladed FMS fan units do give an amazing punch but if you want more power, there is a 4S version which should satisfy those speed freaks amongst you.

Flight times are surprisingly good so expect a good 5-7min depending on throttle use.

So all in all the Phantom is a great little models and flies very well. The ethos was to put the fun back into aero modelling at a budget that hopefully all will be able to afford…so a cheap model that could be made from what you have in the scrap box, and you instantly have big fun for small bucks
Enjoy!

Words 2582

F4 Phantom

Wing Span:	23” (586mm)
Length:	27.5” (695mm)
Wing Loading:	22.oz/sq’(6.6kg/m2)
Target Weight:	22oz (0.60kg)
Wing Area:	0.1 m2

Additional plans, canopy, combined CNC/wood pack are available from :
www.TonyNijhuisDesigns.co.uk
Email: sales@tonynijhuisdesigns.co.uk
Phone: 07563 518159 9am to 4pm