# 27” Span EDF F9F-Panther

So, this is the second model in this latest Mini Jet series. If I’m honest, this is probably the nicest flyer out of the current four and dare I say the best looking. Certainly the US Navy planes from around that era of the 1950s and 60s, had plenty of exciting colour schemes available to mimic. So finding a scale scheme that suits the use of bold colour coverings, especially light grey, yellow and flashes of red, wasn’t too difficult to find. It really does make a striking looking aircraft….and dare I say, something that these tired old eyes of mine can see in the air, without too much fuss.

So, looking forward, after the Panther, will come the F9F Cougar and ending with the F-16 Falcon. These next two will be scheduled for September and November 2023 issues of RCM&E, respectively.

I think one of the key drivers for the success of these little models, has been down to the small handy size and the frugal cost to build one. With a cheap EDF, economy servos, batteries and speed controllers, it really was maximum fun for minimal money, and right now in these times of austerity, every little helps.

In recent years, the ‘inlet bell-mouth’ as a standard feature on fan units, has been offered by most, if not all EDF manufacturers. This effectively does away with the need for a smooth moulded air intake within the model. As a consequence, it allows for a simpler installation of the fan unit into the fuselage and only requires a simple discharge tail pipe, fitted to the rear of the fan unit.

Now I will admit that the smooth intake ducts are still generally found on ‘ready to fly’ designs as they do provide a more efficient installation. However, more recently, manufacturers have been dispensing with these, in favour of cheat vents, local to the fan intake. This is something I have been doing for quite some time now, as trying to make smooth intakes out of balsa wood, is pretty challenging, and would really over complicate the design. So, it’s nice to see the ARTF manufacturers, are now following suit.

The simple analogy is; as long as you make enough holes just in front of the fan to allow it to breathe, you will have a ducted fan model that will work very well indeed

The Panther was tested on a 3S FMS fan unit, which gives a very scale performance. If the builder wishes to install a 4S version, there really isn’t a down side to installing this, except the ubiquitous 3S 2200mah, which most modellers will have kicking around their workshop in their droves, will have to be substituted for a 4S 1800mah battery ……. These models are quite small, so the key here is to avoid adding too much weight when moving up to a 4S setup….

To assist the builder, I have once again made a vac formed canopy available.
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 through Tony Nijhuis Designs Ltd (TND). The plan itself will only be available in this edition of the magazine with future copies again only being available through TND.

For this model and the next two designs, a full set of decals and pilots will be available through Tony Nijhuis Designs Ltd (TND).

The FMS or PowerFun fan units can be sourced from 4-max.co.uk.
The batteries used were a 3S-2200mah 50-60C LiPo and the servos were a cheap and cheerful 6g to 8g, (1kg/cm torque) Sub Micro type.

For the ESC, I suggest you get a 40 Amp 2 to 4S unit. One thing you will need to do is set the ESC timing to “high” or “hard”, this will suit the EDF motor and should give better performance. You will also need to change the low voltage cut off level to the lowest possible setting to stop premature cutting of power to the motor if the voltage dips too low.

Lastly and possibly the most important thing to say, is 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. Weigh 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.

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 wing panels, to a smooth flowing profile.

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 joined together and fit the 3mm birch ply wing spar 4.
To add a little extra strength, cut a 40mm wide strip of 50g/m glass cloth and wrap centrally around the join. Secure the cloth with PVA glue.

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

## Wing Tanks

The wing tanks have a centre core 3, which is the same thickness as the wing itself. Use some 12.5mm balsa sheet stock to make four wing tank profile pieces.
These will be used to sandwich the centre core and make two wing tanks, 31.5mm thick.

Using a razor plane, profile the tanks to a cylindrical shape as shown on the plan. When done, use fine abrasive paper to round off to a smooth flowing curve.

Only glue these into position once the wings and tanks have been covered.

## Fuselage

Begin cutting out the mid fuselage side pieces 5 and all formers 6 through to 11.

Mark the location of the formers onto the left and right hand side of each fuselage side.

Tack glue 6A to 6 in order to make a complete former. This former is made in two parts just in case the fan should ever need replacing.

Check that the fan fits correctly through the hole in 6/6A. For the 50mm PowerFun EDF unit, the opening in the former will have to be opened up slightly to accommodate the unit.

Now fit the formers 6/6A & 7 to one side of the fuselage. Add the other fuselage side.

Now add the remaining formers 8, 9, 10 and 11. If you have a SLEC Ltd building jig, it would be worth using this when adding the remaining formers, so the fuselage will remain straight and true.

Now make up the thrust tube. I have shown on the plan a cut outline of the thrust tube, before it is rolled. The tube is made from 140 micron thick acetate. You will be able to source an A4 sheet of this on either EBAY or from a stationers ….it is basically the thin clear plastic material, used on the front of 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. Make it a straight tube and then secure with a small piece of scotch tape at the fan casing.

At this point, it is advisable to fit the fan unit into former 6/6A. As suggested on the plan, I used a couple of dobs of silicon or hot glue to secure this; you don't need anything more than that. A point to note here is the new FMS fans have been made from a different type of plastic and hot glue does not adhere well to it. I would suggest you key the glue areas on the fan casing with sandpaper.

Now slide the rolled tube in from the rear of former 11. 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 11. 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….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 correct.

The 5mm square fuselage stringers can now be fitted.

Now sheet the top and bottom sides of the fuselage with 2.4mm soft balsa sheet. You may need to wet the outer surface of the sheeting to assist with the rolling against the formers.

When finished, trim the top and bottom fuselage sheet edging, flush with the top and bottom stringers and the formers

Now sheet the top and bottom of the fuselage with 5mm sheet balsa.

Now make up the nose cowl using laminates of 6.5mm balsa from the wing sheet stock or 12.5mm balsa. The cowl corners are lined with 9.5mm balsa triangle.

The nose block is made from laminates of 12.5mm sheet. Make sure you cut to the side profile as shown on the plan. Position and glue this on to the front of the cowl.

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 triangular balsa is there to be cut into to create the smooth radius curves of the Panther, so don't scrimp on the shaping. Using 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.

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

## Fin & Tailplane

To make up the fin, use parts 16 and 17 and glue them together. Profile the fin leading edge. Put the fin aside and only glue into position once the model is nearing completion.

Round off the tailplane 13, leading edge and chamfer the elevator 14 leading edge, ready for the hinges to be fitted. A 12swg elevator joining rod should be made up as detailed on the plan.

## Putting together

The wings can now be glued into position. They will need to be slid through from one side. A little fettling maybe needed to get them to fit properly. Once done, the rear wing fillet core 19, can be added to the location shown on the plan.

Two fairing formers, made from 3.2mm balsa sheet stock, can now be slid over the wing and glued to the fuselage sides. There is a template on the plan to assist making these.

At this stage, a pair of vent opening should be cut through the fuselage side in the location shown on the plan.

The air intake fairing can now be made by spanning 1.6mm balsa sheeting between the fuselage fairing former and the scribed line shown on the plan.

The tailplane can now be glued into the fin, making sure they are parallel.
Finally glue the fin into position.

The razor back piece,18 can be made and glued into position.

The fuselage access hatch can now be marked and cut out. Use a small hacksaw blade to cut through the top sheeting and the first set of stringers to the depth shown on the plans. Then, using a straight edge, cut through the side sheeting on each side, just above the second stringer down. To release the hatch, use a small hacksaw blade to cut through former 7 and 8. The hatch should just come away nicely. You may wish to line the hatch 'cut line' internally to give it better strength.

On the plan is shown how to make a magnetic retaining catch.

Once happy with the fitment of the hatch, add all the cockpit detail and fit the canopy. You will notice there is a small fairing that blends into the canopy and extends back to the rear edge of the hatch. This fairing is made of balsa and filler is used to blend this to match the profile of the rear of the canopy.

Now mark out the locations of the aileron servos and 'sink' these into the underside wing fillets. The servos can be secured with double sided tape.

The final and most important of all is the large cheat air intake hole, in the underside just in front of the fan. There are also two cheat vents on the top sides of the fuselage to be cut in. *It is important that all the cheat openings shown are cut in the exact positions as shown on the plan*. Failure to do this will cause poor thrust from the fan.
On the underside air intake hole, make sure you chamfer and smooth the entry leading edge of the opening. Also, don't be tempted to reduce the size of the opening. It needs to be the size shown.

## Covering

The prototype was covered using light grey, cub yellow and red Oracover from J Perkins. 4-Max.co.uk also have a good quality film at an affordable price.

As I mentioned earlier, there is a full set of decals available for this model and these are available from www.tonynijhuisdesigns.co.uk

Fit all the control surfaces with flat hinges and secure with glue. Fit all the control horns and pushrods etc.

Note: For the elevator push rod, just use a piece of 14swg wire and push this through the top sheeting, at an angle, to create an entry point, adjacent to 18. The angled hole can be opened up using a round needle file, to give a little clearance to the pushrod

Nose weight will not be required to achieve the C of G with the installation of a 3S 2200mah LiPo battery.

The battery should be secured using self-adhesive Velcro.

## Flying

The first thing to note is the wing loading is quite high for this model at 27oz/sq', but hand launching is quite easy, non the less. You will need full power and a firm throw. Make sure it is straight and slightly up. I suggest for its maiden flight you get a trusted helper to launch the model for you. The model is remarkably strong and if you don't get it away first time, it will 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, expect to put in a touch of elevator just after hand launching.

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

You'll find the model simply grooves and flies on rails, especially on a calm day. However, if you do fly on a windy day, the model will be thrown around a bit so be prepared to fly with more throttle, but I would suggest you save this little beauty for calmer days and winds up to 10mph.

All the classic jet manoeuvres can be done with this model, but you will need full throttle and speed on some as the model doesn't have the momentum to carry through manoeuvre such as big loops etc.....just remember to keep the routine smooth and keep what little momentum it has, going.

Landings are very straightforward and generally you will run out of elevator control before the model will stall. The glide angle is quite flat, even without power

Don't be tempted to adjust the C of G. The Panther has been thoroughly tested and where it is shown on the plan is exactly where it needs to be!

The little 3S-11 bladed FMS/PowerFun fan units, gives 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 minute duration, depending on throttle use.

The Panther is a cracking little model and flies very well indeed. A cheap model that could be made from what you have in the scrap box, a £40 fan unit, a £30 ESC, a £23 battery and a few £8 servos, and you instantly have big fun for minimum cost.

Enjoy!

Specification:

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| Wing span: | 27” (684mm) |
| Length: | 27.5” (696mm) |
| Wing loading: | 27.oz/sq’(8.2kg/m2) |
| Target Weight: | 24oz (0.675kg) |

Additional Plans, VAC set, combined CNC / Wood packs, pilots and Decal sets are available from: www.tonynijhuisdesigns.co.uk
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