25" FOLLAND GNAT

So it's been a couple of months since the launch of the 28" Jet Provost and it really did hit the sweet spot. Not to put too finer point on it, it was a resounding success and sold like hot cakes.....
I think the reason for this and will hopefully transpire for the Gnat too, was I think down to the small handy size and the frugal cost to build one of these models. With a cheap EDF unit, economy servos, 30C LiPo and 40Amp speed controller, it really was maximum fun for minimal bucks.

All of these new mini jets have been tested using the 3S FMS fan unit which gives around 600g of thrust. A few builders of the Provost have gone with the 4S FMS and the 4S PowerFun fan unit (available from www.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....

So after the Provost and now the Gnat ,the two remaining models we have lined up for you are the Hawker Hunter and the F4 Phantom. If there is time, the Lightning and BAC Hawk will following on later next year. We'll keep you posted on these final two in due course.

So having done the Jet Provost in September's issue, it's time now for the Folland Gnat; yet another favourite of mine and yet more indulgence for me. I have always been a long time fan of the Gnat and when I saw the full-size Yellow jacks Gnat at North Weald aerodrome recently, it was such a great colour scheme for such a lovely aircraft.....I was in love!

As we have already launched the Gnat on the www.TonyNijhuisDesigns.co.uk website, I have a good felling this model is going to be just as successful as the Jet Provost.

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 Tony Nijhuis Designs Ltd (TND) and not MyHobbyStores. The plan itself will only be available in this edition of the magazine with future copies only being available again through TND Ltd.

A few other points to note, the FMS fan units can be sourced from www.4-MAX.co.uk. The battery was a 3S 2200mah 30C LiPo and servos were cheap and cheerfully 4.5g-6g 0.85kg/cm torque Nano servos. For the ESC use a 40Amp units as it will be lighter.

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.

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.

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 the 3mm birch ply wing spar fitted. 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 fuselage side pieces 5 and all formers 6 through to 14. Note that the elevator tubes holes should be filed into former 7 as shown on the plan.

Mark the location of the formers on to the left and right hand side of each fuselage side. Add strips of 12.5mm triangle along the top and bottom edge of the fuselage as shown on the plan. The top edge triangle 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 6,7 & 8 to one side of the fuselage. You will note that former 7 is slotted into former 6 to create the fan mounting former. Former 7 should only be tack glued into 6 to give easier access should the fan ever need replacing.

Before gluing 6 and 7 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 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 140 micron thick acetate. You will be able to source A4 sheet of this on EBay or from a stationer'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 prior to fitting the enclosing fuselage side. As suggested on the plan, I used a couple of dobs of hot glue and silicone is all you require to secure.

Now fit the other fuselage side and add the remaining formers 9, 10 and 11.

Now slide the rolled tube in from the rear of former 10. 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, the tube seam should run along the top 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 10. 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 10... 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.

Now install the elevator control cable outers. I would suggest using the 3mm orange tubes from 4-Max/SLEC and used 20swg piano wire for the pushrod.

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

Now make up the nose block 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 block as shown on the plan and glue this on to 11.

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 Gnat, 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. As you profile around the wing slot, you will have to trim away the some of the triangle which covers the wing slot.

Now make the positions of formers 12, 13 & 14 on each side of the fuselage. Note the that height position is quite critical so make sure you check and re-check the position before gluing. Also note that former 12 is sacrificial which means the former is discarded once the model is built.

Now make up the fuselage intake sides,15, from 3.2mm balsa. The inside edges of the fuselage side should now be lined with 9.5mm triangle at the positions shown on the

plan. Again, saw cuts will need to be applied to the triangle to aid bending of the balsa triangle.

The intake sides can now be glued into position against the formers. The rear of the intakes should be sunk into the main fuselage, with the rear edge sitting 3mm proud of the main fuselage.

Now sheet the top and bottom air intakes as shown on the plan.
Use a piece of 3.2mm balsa sheet as a fillet to blend the intakes, smoothly into the main fuselage. You will need your sharp razor plane again here to profile the square edges of the intakes and the fillet at the rear of the fuselage. Then progress on to using a sanding block along the complete length of the intake.

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 bottom 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 4-Max/SLEC at the rear of the hatch and a locating pin at the front, as shown on the plans.

Fin & Tailplane

To make up the fin, use parts 18 to 19 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 makeup the tailplane using parts 16 & 17.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. They will need to be slid through from one side and a little fettling maybe needed (due to the anhedral) to get them to fit properly.

The tailplane halves can now be glued into position making sure they are parallel to the wings.

The sacrificial former 12 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.

The fin can now be added and the fillet pieces 21 & 22 added. Before adding the fillets 22, radius the edge of these before fitting.

Now mark the position and add former 20. Next take a very soft piece of 1.6mm sheet balsa and wet one side only. Gently roll the piece over 20 and the rear fillets. Trim the

bottom edges of the sheeting so sits properly against the top decking. Once happy glue the sheeting into place.

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

The final 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.

Covering

The prototype was covered using Cub yellow Oracover from J Perkins.
The lettering/danger signs decals were supplied by www.becc.co.uk (found on EBay) and the roundels were made from Oratrim.

Fit all the control surfaces with flat flock hinges (from 4-Max or 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 cockpit, 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 21oz/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 simply groves and flies on rails 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.

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 straight forward and generally you will run out of elevator control before the model will stall.

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

The little 3S 11 blade FMS 50mm 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 Gnat is a cracking little model 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, a £38 fan unit, a £20 ESC, a £20 battery and a few £5 servos, and you instantly have big fun for small bucks Enjoy!

Specification:

Folland Gnat
Wingspan-25" (634mm)
Length-29" (745mm)
Wing loading-21.oz/sq'(6.3kg/m2)
Target Weight-22oz (0.60kg)
Wing area-0.1m2

Additional Plans, VAC set, combined CNC /Wood pack are available from
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