DOGFIGHT DOUBLE

MOSQUITO... MOSKITO... TONY NIJHUIS GETS DOWN TO BUSINESS WITH A PAIR OF W.W.II WOODEN WONDERS

Always wanted a Mosquito? Well, what's stopping you? This one really is a little cracker, and oh so quick to build.

Coming up with a dogfight double that's both unusual and inspiring isn't easy. From a designer's perspective a model must satisfy a variety of criteria, i.e. it must be attractive, create an element of excitement and be a challenge. Satisfying these requirements usually means that, either the subject hasn't been modelled before or the size / construction is unique. Inspiration was in short supply when pondering what would occupy this month's centrefold, the main problem being in trying to build upon the success of previous *RCM&E* dogfight doubles and not to simply model different subjects from the same era.

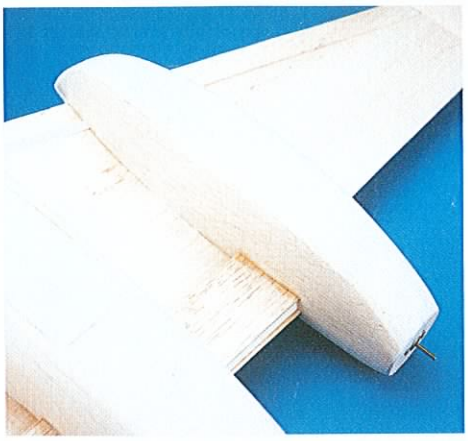
When inspiration did come the origin could be traced back a couple of years when a friend sent me a link to the Airwar.ru website, the main point of interest therein being the Focke-Wulf Ta-154 (code name Moskito). The aircraft was designed as a strike attack and night fighter similar to the DH Mosquito, and like its British counterpart was constructed of wood, though it proved not as successful in action. I found the look of the Moskito really appealing, and the thought of designing a twin engine model as a double plan feature started to grow. But for a double plan feature you need two subjects - what better partner for the Moskito than the Mosquito? So, the challenge was set and it was time to don my designer's hat once more and get down to business.

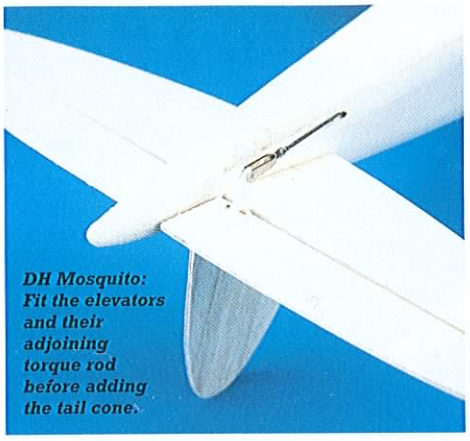
TOTAL CAD

As with all my designs of late, the plans were drawn on CAD. With the amount of information currently available on the web it didn't take too long to find and download a suitable 3-view image file.

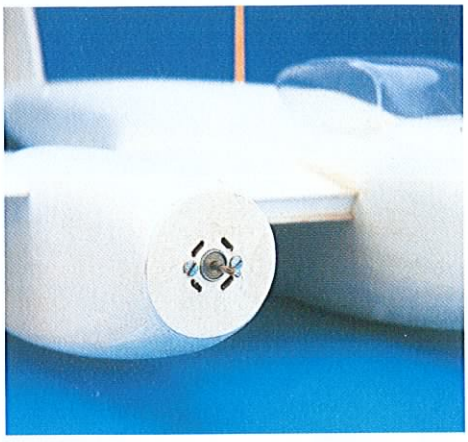
The aforementioned website Airwar.ru is great for downloading such information, and the choice of subject matter is truly immense.

With the images imported into Autocad it's a very quick job to get a raw, scale outline traced out. From here relevant details can be added and the background images either deleted or moved away to reveal the drawn outline, allowing the real work to begin. To complete a reasonably straightforward plan, to the stage where it can be plotted and cut up to form templates with which to build from, will only take 3 to 4 hours. Finally, tidying the drawing takes a few more hours, though this process is helped no end by the mass of library





DH Mosquito: Fit the elevators and their adjoining torque rod before adding the tail cone.



drawings at my disposal (servos, motors, gearboxes, control linkages, horns etc.), which can be easily imported into the working drawing - it's a little bit like computer Lego! So, that's the model in 'software' form, what about the hardware?

QUICK 'N' EASY

As with my previous dogfight aircraft the design philosophy was to make this pair quick, easy and cheap to build, keeping them reasonably small and using the tried and tested construction method of 'box' style fuselage and sheet balsa wing (one piece, 38" span for both models). Power is provided by the ubiquitous Speed 400 6V motor and $^{2}/_{3}$ sub-C 1300CP or $^{4}/_{5}$ sub-C 1700CP cells. Micro servos and a micro Rx are used along with a single 30A speed controller, driving the motors in parallel.

Vac-formed items are available from the Highbury Leisure Plans Service - canopy and scale spinners for the de Havilland, canopy, cowls, and spinners for the Focke-Wulf. Good news indeed - the thought of making a single built-up radial cowl is bad enough, let alone two! Fortunately I have a second-hand vac-forming machine in my workshop (the best £200 I've ever spent) - believe me, making solid plug moulds for vac-form cowl production is far easier than making built-up items. Actually, I'm often asked as to how I produce a clear canopy or cowl for my prototypes, so I thought I'd digress for a minute to describe the process.

MOULDING MAGIC

To make a radial cowl, balsa block is first cut to the approximate dimensions before being transferred to a small lathe to form the correct shape. For canopies and the like I carve the mould out of solid block balsa by hand and sand to a smooth finish. Where appropriate, frame lines can be applied using 1.5mm thick ply or plastic card. From here a vac-form is taken, using thin 0.5mm High Impact Polystyrene (HIP) plastic sheet. The thin plastic allows all the fine detail to come through as it's drawn down over the mould during the heating / suction process, which unfortunately also includes the grain of the balsa!

To rid ourselves of this undesirable effect the balsa plug is removed from the plastic and the void filled with Stonecast plaster. Stonecast is similar to Plaster of Paris except the curing time is only an hour or so. It's also much stronger and is waterproof when dry. When the Stonecast has hardened it can be removed from the plastic ready for cleaning and polishing. To remove woodgrain marks and any other imperfections it's razor planed, sandpapered, and finally polished with wet-and-dry paper (used wet). When this is done you end up with a super-smooth plug mould, ready to use again and again.

TOP LEFT: Those radiators on the leading edge of the DH Mossie are superb for hiding the motor wires.

TOP RIGHT: Standard Permax 400 6V 'can' motors have been serving electric flight for many years and seem as appropriate now as ever. In short, they're cheap, they're cheerful, and they deliver the goods!

FREE PRO-PLAN – PART 1

Both aircraft are constructed in the tradition of the previous Dogfight Double aircraft using a flat sheet wing and sheet balsa fuselage.

FLIGHT PREVIEW

This article will stretch over two issues, which means that you won't know how the model performs in the air until part two comes along next month. I know that this can be frustrating as the flying report is usually the main point of interest with an article such as this, so I thought I'd squeeze in a wee snippet of things to come.

The Mosquito was first to reach completion, though when the day of reckoning came the weather was less than favourable for flight-testing. Nevertheless, I kept an eye on the conditions and by 7.30pm the strong winds had subsided to a flat calm, leaving a beautiful evening - albeit with rapidly fading light. My favourite test field is just two minutes down the road so the Mossie was soon launched with a slight push into the calm twilight. At this point two things can happen - it can all go swimmingly or totally pear shaped, the latter usually as result of unknowns such as C of G location, correct wing and tailplane incidences, correct control deflections etc.

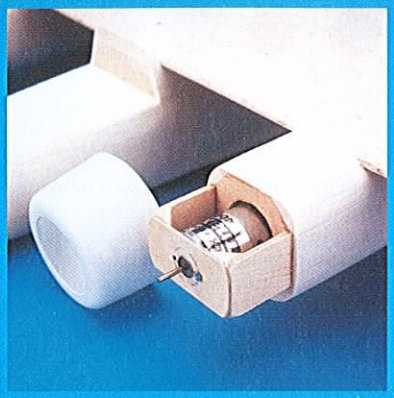
Well, in this instance, she made a determined bid for the ground which, as you'd expect, I immediately corrected with up elevator. Alas, this was not the best thing to do, for on application of said control she immediately flicked in!

Although a few cracks appeared through the covering, the model was still intact and ready for another go. However, before the second attempt I substantially reduced the elevator movement and moved the C of G forward by shifting the position of the battery pack.

At the second time of asking the model was again launched with a slight push... again it failed to get away, this time hitting the ground flat and skidding to a halt. It became obvious that the still, calm conditions weren't helping and I wasn't launching the model hard enough to accord. Ok, so third time lucky?

This time the Mossie was given a good firm launch, and she was away. There was a small amount torque roll to the left as expected but once flying speed was achieved she performed admirably. Anybody familiar with the Mosquito and those beautiful (but highly tapered) wings will notice that the tips shown on the plan have been widened by 50% to reduce the risk of tip stall. I know this may grieve the purists but this is a fun scale model, and the main aim is to make the design a forgiving one.

Suitably relieved by this successful flight, I pressed on that evening to finish the Focke-Wulf ready for the next day. As both models were very similar in size and shape I decided to transfer all the settings (i.e. elevator and aileron movements, trim settings etc.) to the FW. Now you've probably heard the expression (or is it a song?) 'What a difference a day makes'... and it certainly does. The next day dawned grey



Motor installation and access couldn't be easier.

I think it's fairly safe to assume that less people will build the Focke-Wulf, though it's arguably the better looking of the two aircraft.

and windy, not ideal conditions, indeed typical British weather. Back at the flying field the FW Moskito was given only a gentle hand-launch into the strong wing and she was away - no torque rolling, just a straight and very fast climb out... brilliant... just as I'd hoped. So there you go, now you know they both fly you can rest easy and await the full flying report next month.

Okay, enough appetite-whetting, Let's get on with the build. Both models are very similar in construction, so rather than going through the build sequence of both I'll describe the building in general, highlighting appropriate and specific differences where they occur.

WING

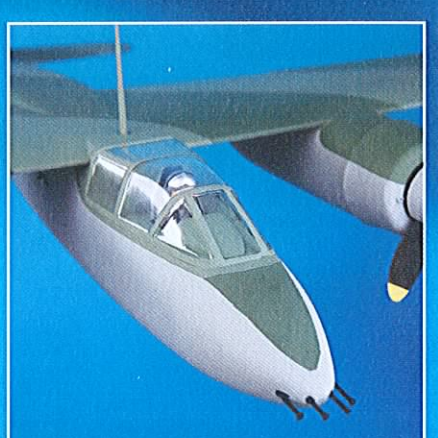
Using 9mm balsa sheet, cut out the 6 main pieces (Moskito 5 pieces) that make up the wing panels. Be sure to select the same quality of wood (medium grade) for both the left and right wing panels so the weights are similar. Glue the wing parts together to form a left- and right-hand panel in the case of the Mosquito, a complete wing in the case of the Moskito. What we need to do now is take this flat wing and shape some profile into it. To do this, mark the area of wood requiring removal to create the basic wing profile (detail shown on the plan). The only sensible tool for this job is a (sharp) razor plane, and when you've formed the basic shape, use a sanding block (length 200mm or more) to complete the wing to the finished profile as shown on the plan.

Repeat this procedure on the other wing panel, trying to get both as close as possible in terms of profile. Don't be too concerned if they're not identical as it won't make a noticeable difference in flight - I know that from experience! When you're happy with the finished section, cut out the ailerons and chamfer their leading edges.

Next we need to make up the aileron torque rods using two lengths of 14swg pushrod, bending an elbow and fitting a proprietary torque rod end. Of course, you can also buy these ready made (Radio Active) from your local model shop, so do whatever takes your fancy.

To fabricate the bearing slot for the torque rod to sit in, use the threaded end of a spare pushrod to file a slot in the wing underside in the position shown on the plan. Make a dry fit of the torque rod to make sure it sits well recessed into the wing, then remove it and apply some light grease to the bearing part of the rod that locates into the slot. Reposition the rod into the slot and pack the remaining slot with scrap balsa infill. Don't be concerned about getting glue on the torque rod as the grease will protect it. Now trim the slot infill flush with the wing surface and hey presto... a perfect aileron torque rod installation.

"...once flying speed was achieved she performed admirably"



As always, a pilot and a modicum of cockpit detail add greatly to the authenticity.

To join the wings of the Mosquito, make up the 4mm birch ply wing brace and chamfer the mating edges of each wing panel to achieve the correct dihedral. Glue the brace to one wing panel only, then fit the other panel in position at the correct dihedral and apply thin cyano to the joints.

DATAFILE

Name:	DH Mosquito & FW Ta-154
Aircraft type:	Electric semi-scale twin
Designed by:	Tony Nijhuis
Wingspan:	38"
All-up weight:	30oz
Wing loading:	14 oz / sq. ft.
Rec'd motors:	2 x 400 6V
Rec'd battery:	8 x 1300CP
Rec'd no. channels:	3
Control functions:	Aileron, elevator, throttle
Control deflections:	Aileron ±4mm, elevator ±6mm

Moulded parts: Vacuum formed parts for the **DH Mosquito,** including canopy and spinners (ref. CANRC 2023) are available from the Highbury Leisure Plans Service (01689 886661) priced at £12.50 plus £2.15 UK p&p (£2.80 overseas). Similarly, a set of spinners, engine nacelles and a canopy (ref. CANRC 2022) for the **Focke Wulf Ta-154 Moskito** are available priced at £13.50 plus £2.15 UK p&p (£2.80 overseas).

FUSELAGE

Cut the fuselage sides from 3mm balsa sheet and all the formers from 3mm liteply. Using soft 9mm and 12mm triangular section balsa, line the inside edges as indicated on the plan. To aid the bend of the fuselage onto the nose former, make a number of saw cuts into the triangular section as shown on the plan. Now fit the intermediate formers 10, 11, 12 and 13 (Moskito 11 and 12) to one fuselage side. When happy fit the remaining fuselage side. Next thing to do is to pull the tail end of the fuselage together and glue, but before doing so you'll need to trim the triangular section to the amount shown on the plan. Note that the FW Moskito is trimmed at an angle and flush at the tail edge so the fuselage sides actually join. Now fit the remaining formers.

Next, make up the battery support tray from 3mm liteply and fit into position. On the DH Mosquito, remember to cut a hole adjacent to former 13 to allow the speed controller to recess into the top forward compartment.

Now trim and fit the cockpit floors and apply the forward (Mosquito only) and rear top decking, then enclose the fuselage by adding the lower decking. When dry, use a razor plane to roughly profile the square edges as indicated on the plan. The nose block can now be fitted, and again roughly shaped. Continue to plane the fuselage edges to a smooth flowing curve. When planing the corner edges don't be frightened to cut into the triangular section; its purpose is to allow a smooth curve to be formed, not to strengthen the joint.

When happy with the finish, cut out and test fit the tailplane. To check alignment, put a straight edge on the wing seat and trim the tail seat so the tailplane sits parallel. When happy, glue the tail into position. Fit the tail block on the DH Mossie, but only after the elevators and elevator torque rod have been made. With the FW a similar principle applies, fitting the torque rod and then infilling the remaining slot in the tailplane. Infill the space above the tailplane with scrap balsa as indicated on the plan and sand to a smooth finish. Now make up the fin / rudder, cut the respective slot in the top of the fuselage and check that all is square - but don't glue into position until the fuselage and fin / rudder are covered.

That's it for now, next month we'll conclude the construction and spill the beans on how they perform!

DOGFIGHT DOUBLE

MOSQUITO VS MOSKITO: TONY NIJHUIS COMPLETES THE W.W.II FIGHTER DUO THAT ALMOST WAS

Who can resist the deeply evocative profile of de Havilland's wooden wonder? Oh, decisions, decisions...

Originally conceived in 1938 as a small bomber which, as Jane's reported at the end of the war, 'was to rely for its safety upon speed and altitude', the DH98 Mosquito first went into action over Europe in June 1942. Making the first daylight raid on Berlin on 31 January 1943 - when Mosquito fighter-bombers of 105 Squadron quite literally rained on one of Goering's parades - was one of many fighting fillips for de Havilland's wooden wonder, which had quickly earned a reputation for near invulnerability, despite the risks of the low-level missions it had initially undertaken.

So it was that in 1942 the Reichsluftfahrtministerium (the German Air Ministry), having quite overlooked the potential of the 370mph He119 back in 1937, found itself urgently in need of an answer to the Mosquito, and in particular a dedicated night-fighter that could intercept the 380mph Mk.IV Pathfinder Mossie.

One of the designs competing for the role of Mosquito-killer was Kurt Tank's Focke-Wulf Ta-154 Moskito, which in early trials proved itself capable of nearly 390mph even when fully armed and slowed by unwieldy radar antennas. Luckily, the 154 had an Achilles heel - the limited availability of the Junkers' Jumo 211R and 213 engines, which was to critically disrupt the aircraft's development.

Sixty years on, we can learn from the German's mistake and have our choice of motors ready to hand as we prepare to finish our model 154.

THE CASE FOR MODERATION

As both of these models are reasonably small, their all-up weights fall within the operating limits of a single 400-size motor, so fitting a pair of standard 6V 400s will give them plenty of power. Opting for more powerful brushed or even brushless motors would only increase the risk of torque roll on launch, especially with the Mosquito. This, coupled with diminished aileron authority at launching speeds, can lead to things going pear-shaped very quickly! If you simply must install hotter motors, however, try and source a pusher prop' for one of the motors, and use a contra-rotating set-up to help keep things under control.

BUILDING THE NACELLES

The nacelles are very easy and straightforward to make, so they shouldn't be a chore - even if you have to make four of them!

For the de Havilland, start by cutting out the nacelle sides, doublers and former, then glue the doublers into position to create a pair of left and right-hand sides. Next, cut and insert lengths of 9mm triangular strip to the front top and bottom edges as shown on the plan, before trimming the front edges of the nacelle square and fitting the ply motor nose-ring.

For the Focke-Wulf, cut out the nacelle sides and glue lengths of 12mm triangular strip to the top and bottom sides, again making a set of left and right-hand sides. Glue the liteply motor mount extension arms into position as shown on the plan. Then glue the front two formers into position on one of the nacelle sides before gluing the other side on top. Finally, fit the ply motor mounts and strengthen the corners with 9mm triangular stock. The upper forward nacelle decking can then be cut and glued into position.

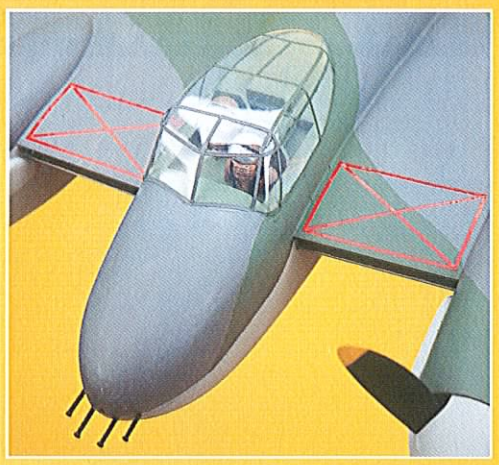
If you're building the DH Mossie, you may want to install the motor and its wiring at this stage, remembering to leave yourself enough to reach the

Worried about tapered wings? You needn't be. Neither aeroplane displays any sign of a tip stall at low speed.

fuselage with a little bit to spare. Before feeding the wire through the side of the nacelle, don't forget to profile the forward edges of the top decking. Oh, and if you haven't yet chosen your Mosquito motors, you'll need to make an access hatch, preferably in the underbelly of each nacelle.

Finally, pull the rear sides of the nacelle together and glue the last former into position. Fit the forward bottom decking and add the rear cross-sheeting as far as the rearmost nacelle former, then cut and shape the tail block, and glue it into position.

Okay then, all that remains is to plane and sand the nacelles to leave smooth flowing curves.



Aileron and elevator servos sit side-by-side in the fuselage with the Rx and battery pack in front. Note the thin ply cover strips over the aileron torque rods (trailing edge).

ASSEMBLING THE PIECES

Now that we've completed construction of all the components, we can start putting the thing together.

Begin, then, by gluing the wings to the fuselage. With the DH, you'll have to remove the plastic ends of the aileron torque rods and fold the arms flat against the wings which will then be able to slide through the slots in the fuselage. Before fitting the wings of the FW, meanwhile, make a channel in the underside of the wing to carry the power wiring between the fuselage and nacelle.

ACCESS HATCHES

With the wings attached, you can cut out and remove the battery and radio access hatch, and fit the lugs that'll hold the hatches in position. You'll notice that the Mosquito plan shows a couple of hatch rocker pins fitted through the fuselage, which help to bend the hatch to the match the curve of the fuselage underside. They also put the hatch under slight tension, meaning that a single retaining screw is all that's needed to hold it firm on its lugs. Our German friend, on the other hand, uses two screws to secure the hatch.

Now that you can get into the fuselage, centre the aileron torque rods and re-attach their plastic ends to the threaded end.

FITTING THE NACELLES

After marking the location on the wing, glue the nacelles in place and feed the end of the power wiring through into the fuselage.

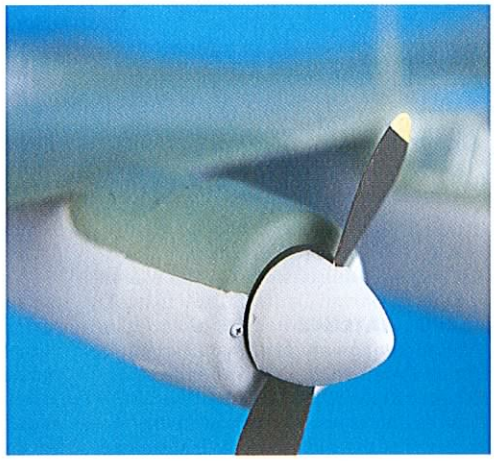
Both models require nacelle tail blocks to be cut and fitted, while the Mosquito design also calls for wing nacelle fairings, and wing radiator fairings. The latter are really for appearance, of course, but they also serve to hide the wiring between the nacelles and the fuselage. The radiator fairings are easily made, each using just two pieces of 1.5mm sheet balsa, one of which is feathered into the top of the leading edge between the nacelles' inner faces and the fuselage, while the other is fitted to the underside of the wing. If you wish, you can fill the void between the pieces of scrap 3mm balsa.

When you've finished, apply filler to any areas that require it and, when dry, give the fuselage a final sanding.

Before you cover the models, take a little time to add some cockpit detail. The scale of these aircraft lends itself nicely to adapting J. Perkins' small plastic jet pilots, which really set the aircraft off a treat when they're painted. I also tend to finish off the cockpit by fitting the canopy prior to covering, but it's a matter of personal preference.

COVERING & FINISHING

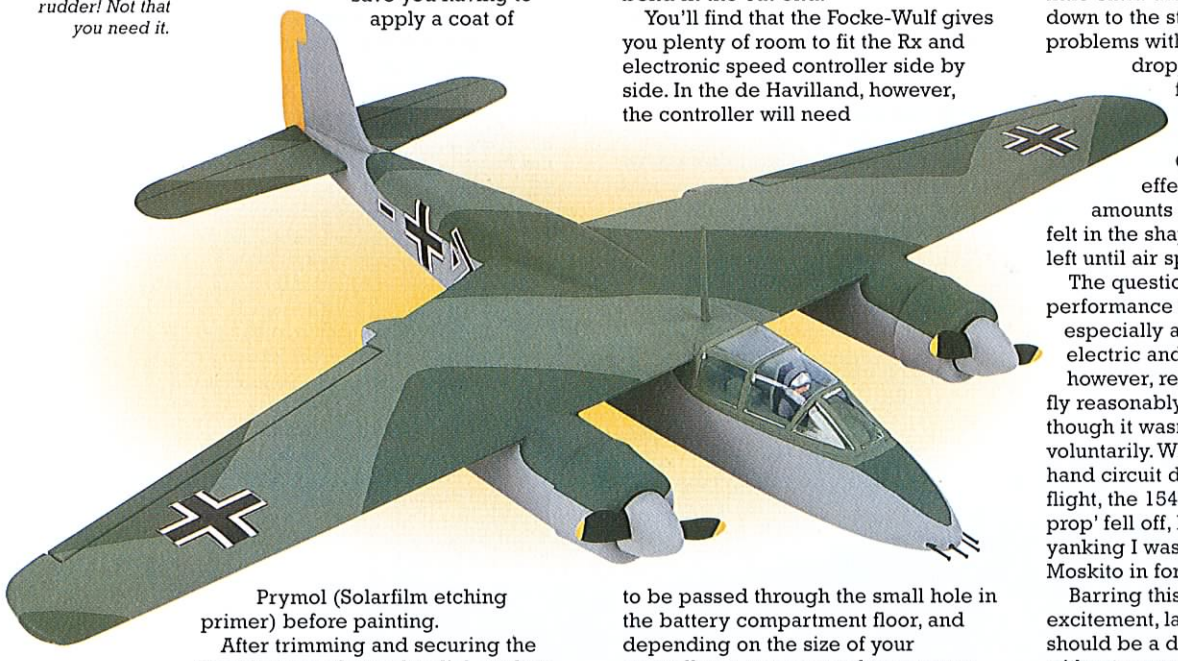
I used silver Solarfilm to cover the prototype for the simple reason that it was all that I had at the time; although there are some tight corners to reach into, I was able to get to most of them with a small covering iron. That said, it's more difficult to cover one-piece



Fun Fighter principals have been adopted for the control surfaces, i.e. no rudder! Not that you need it.

models like these with film than it is a larger model with removable wings, so you might find tissue and dope a better approach - it'll also save you having to apply a coat of Prymol (Solarfilm etching primer) before painting.

After trimming and securing the Moskito's vac-formed radial cowls to the motor mounting plate with self-tapping screws, spray or brush-paint the airframe using either matt enamel or acrylic paint.



Both aircraft are very attractive in their own way, though I particularly like the Teutonic simplicity of the Focke-Wulf.

RADIO INSTALLATION

Start by gluing the servo support bearers into place, and fitting the elevator and aileron servos. Then attach the control horns to the elevator, and make up the connecting pushrod using 16swg piano wire. I used 2mm threaded-end rod for the aileron pushrod, which I trimmed to length before putting a Z-bend in the cut end.

You'll find that the Focke-Wulf gives you plenty of room to fit the Rx and electronic speed controller side by side. In the de Havilland, however, the controller will need to be passed through the small hole in the battery compartment floor, and depending on the size of your controller, you may need to open up the hole slightly for better access. Once the batteries, Rx and controller are on board, secure them in position using self-adhesive Velcro, then connect everything up and check that it works. With a bit of luck, you'll be ready for the off!

FLYING: TAKE 2

If last month's taster of the models' performance made you think about building a Mossie for yourself, here's a little more excitement from the flying field to encourage you to start bashing some balsa!

As I mentioned last time, these models need a good hand-launch on a calm day, and especially the Mosquito. With any twin-engine model - particularly ones of this size, with tapered wings - there's always a possibility of torque-rolling on launch, so be cautious: get someone to launch the model for you, use reduced power initially, slowly feeding in the throttle after a second or two, and be ready with some right aileron. Of course, if you're flying into a 10kt wind, you shouldn't have a problem!

Once they're flying, the models will build up speed and climb very quickly. Judging by the prototypes the best thing to do is adjust the trims, so get as much height as possible, then throttle back and trim the models so that they fly straight and true. With this done, you'll find that their agility makes it possible to perform most aileron and elevator-induced manoeuvres.

Flown head to head, the Moskito proved to be the quicker of the two - something I found a little surprising, though it may have been because the dummy wing radiators on the prototype Mosquito hadn't previously been filled in and were creating a little extra drag. Slowing both aircraft down to the stall revealed no problems with either: they both dropped into a steep glide, from which they quickly recovered when throttle was applied.

Once again, the torque effect induced by large amounts of power will make itself felt in the shape of a slight pull to the left until air speed has built up.

The question of single-motor performance doesn't really arise, especially as these models are electric and therefore reliable! I can, however, report that the Moskito will fly reasonably well on one engine, though it wasn't something I did voluntarily. While carrying out a left-hand circuit during the second test flight, the 154's right-hand Gunther prop' fell off, but by banking and yanking I was able to bring the Moskito in for a safe landing.

Barring this sort of unexpected excitement, landing these models should be a doddle: they glide nicely without power, and there's no risk of tip stalling even when you're flying at the very back of the drag curve, where the models simply 'mush' and sink.

MAKE UP YOUR MIND

If you're still deliberating which Mossie to build, here's some food for thought. Both aircraft have comparable wing loadings, identical power, and very similar flying characteristics. The Moskito, however, is far simpler to build and has a lower parts count. Also, because of its shoulder-wing configuration, it's more stable and forgiving in the launch than the Mosquito, which can be a touch temperamental in calm conditions. So, assuming that patriotism doesn't make the choice for you, I'd suggest that you build the Moskito: it's a cracking looking aircraft, and one that I believe hasn't been modelled before.

MOULDED PARTS

Vacuum formed parts for the DH Mosquito, including canopy and spinners (ref. CANRC2023) are available from the Highbury Leisure Plans Service (01689 886661) priced at £12.50 plus £2.15 UK p&p (£2.80 overseas). Similarly, a set of spinners, engine nacelles and canopy for the Ta-154 Moskito (ref. CANRC2022) are available priced at £13.50 plus £2.15 UK p&p (£2.80 overseas).