DOGFIGHT DOUBLE

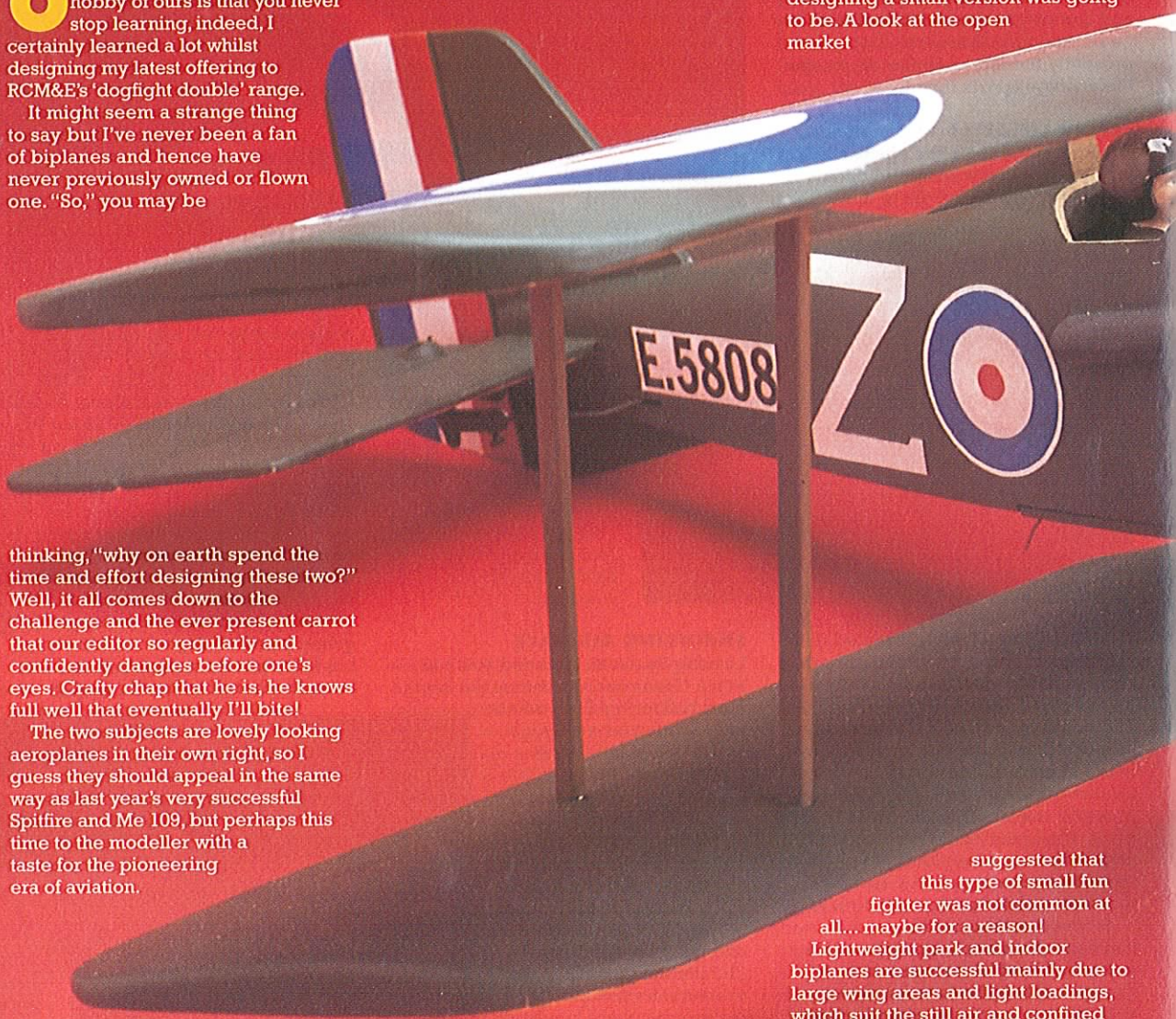
CABBAGE CRATES OVER THE BRINY!! BATTLE IT OUT WITH A PAIR OF CLASSIC W.W.I BIPLANES - THE SE5A & FOKKER DVII, COURTESY OF TONY NIJHUIS

Like Tony's previous Dogfight Double pair, the SE5 and DVII have that tempting 'build me' look about them.

One of the great things about this hobby of ours is that you never stop learning, indeed, I certainly learned a lot whilst designing my latest offering to RCM&E's 'dogfight double' range.

It might seem a strange thing to say but I've never been a fan of biplanes and hence have never previously owned or flown one. "So," you may be thinking, "why on earth spend the time and effort designing these two?" Well, it all comes down to the challenge and the ever present carrot that our editor so regularly and confidently dangles before one's eyes. Crafty chap that he is, he knows full well that eventually I'll bite!

The two subjects are lovely looking aeroplanes in their own right, so I guess they should appeal in the same way as last year's very successful Spitfire and Me 109, but perhaps this time to the modeller with a taste for the pioneering era of aviation.



GENESIS

Having never attempted a biplane design before I decided to study some literature and have a chat with knowledgeable friends to get a feel as to just how easy or difficult designing a small version was going to be. A look at the open market suggested that this type of small fun fighter was not common at all... maybe for a reason!

Lightweight park and indoor biplanes are successful mainly due to large wing areas and light loadings, which suit the still air and confined conditions expected. With the scale I had in mind and the conventional building approach anticipated to make this a workable free plan, the model was going to have to be a 400-

Machine gun is a simple yet very effective little detail.

So with the odds stacked against me it was time to start drawing.

Those familiar with my previous articles may remember that I like to draw using AutoCAD and get a pretty near completed plan before committing knife to wood. The plan took around 8 hours to draw, the accuracy of the scale outline assisted no end by scanning 3-view drawings of both models and tracing around them. The brief was to provide a basic design that is not only easy to construct but also provides a good platform for a small amount of scale detail.

To make construction as simple as possible and provide suitable rigidity to the top wing, I reckoned a one-piece model was required. I'm a great fan of the flat sheet wing for this size of aeroplane due mainly to its stall characteristics and the ease of construction. However, I decided to rule that method out and go for conventionality - well, almost! In truth, I opted for a Clark Y wing section, sheeted on the upper surface only, over a simple framework of ribs, the latter joined by a lower spar. The whole would be covered top and bottom with film. As it is, I'm rather pleased with the result which is very light and robust, and with a 'conventional' sheet balsa fuselage and tail there's nothing too taxing in terms of the build.

The prototype took three, four-hour sessions to build, to a point where it was ready for covering and test flying. This particular model used the Multiplex packaged gearbox unit, which contains a Permax 400-6V, 2.4:1 plastic gearbox and a 7" black Gunther prop - all for around £12. JP Naro servos were used to drive the elevator and ailerons (lower wing only) and a pack of eight Sanyo 800ARs just fitted through the cockpit opening.

size electric job and (at a guess) be no heavier than 24oz to have any chance of success.

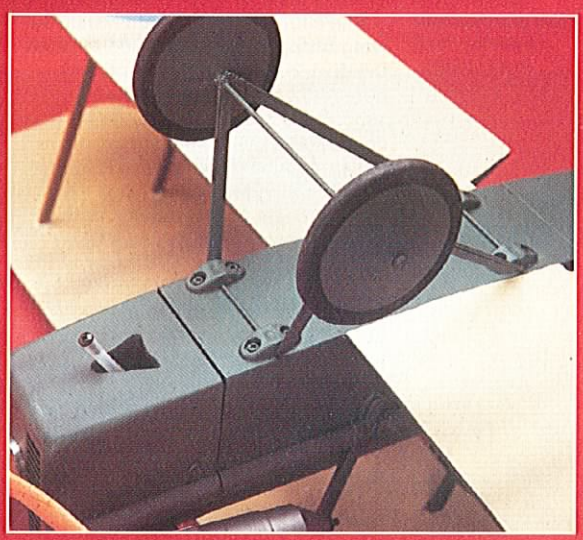
After thinking about all the potential problems I concluded that more things could go wrong than right here... ooh, great! I do like a challenge!

Finally, a four-channel Futaba micro Rx and Ripmax Xtra 20 amp speed control, completed the installation.

PRAISE BE!

Considering this was my first foray into biplane design I was quite pleased with the outcome and (strangely) had enjoyed building the model... didn't think that was going to happen! Even stranger was when 'er indoors' made an

Simple saddle-clamp arrangement is used to secure the wheels. Note the air exit aperture on the underside of the cowl.



In terms of directional control, rudder and elevator are plenty good enough for these little models.

uncharacteristic entrance into the workshop and rather than the expected: "Not another toy," uttered, "Oh, that looks pretty." Shock horror!

The final commendation came when I took the prototype to the Hastings MFC Scale Weekend. Interest was rife, far more than I'd ever expected. So, it seems I may have got it wrong. Not only had I enjoyed building the model but the modelling fraternity liked the concept too. Only one thing left though, the acid test... how will she fly?

ABOUT TURN

I usually leave the flying report until the end, but it's the fun bit and I can't wait to tell you.

Living in the country I'm lucky not to be too far from a place to fly. My favourite site has the ground sloping away on three sides, which mostly allows you to launch downhill and into wind. Perfect conditions prevailed on the test day, an early summers evening and not a breath of wind. Now, not knowing exactly where the C of G was, what the control movements were, and whether the ailerons were going to work as planned, I was slightly apprehensive as the model was hand-launched for the first time - and I was right to be!

The 'good lady wife' thought I was very sad when she saw me making the dummy radiator grill. Not so, for it doubles as a convenient air intake.

Side profile is very convincing for a small model... don't you think?

She climbed straight into a stall, the wing dropped but I managed to catch the dive (excessive elevator throw helped), the remainder of the 20-second flight being best described as controlled panic! She landed unceremoniously on her back, luckily without damage - the only positive thing to come from the flight. At this point my thoughts went back to my earlier discussions with friends and the difficulties I could face. I did think of throwing the towel in and moving on to the DC3 (keep your eyes peeled in a few months time) but I decided not to let it get the better of me.

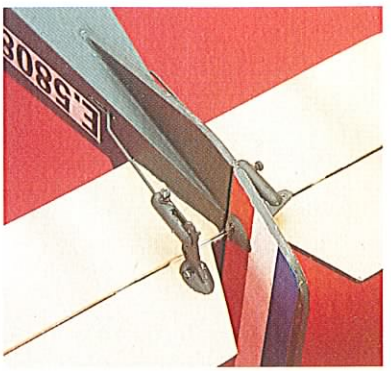
To cut a long story short, the problems were systematically sorted over a period of a week. A summary of troubles: Too much elevator movement, a rearward C of G, incorrect top wing incidence, incorrect tail incidence, insufficient down-thrust / side-thrust. and insufficient aileron authority, culminating in the modification to rudder as the primary direction control. I really did get it all hopelessly wrong, however, it's been great fun to put right and an interesting learning experience. The model is now much better behaved, very agile, and, dare I say it - even more fun than the previous Dogfight Double.

The move from ailerons to rudder has very much simplified the design and given better access for the battery pack. Oh, and I nearly forgot, it's also been fettled for i.c. power - the little O.S. 10LA fits in a treat and is almost completely cowled-in; another option.

If you're a competent pilot and used to flying a small model, you should have no problem handling this pair. Bear in mind however that, as with most small designs, they're less stable than the bigger ones and get out of sight quickly, at which point disorientation can set in. Remember too that they're more susceptible to wind and turbulence.

GET ON BOARD

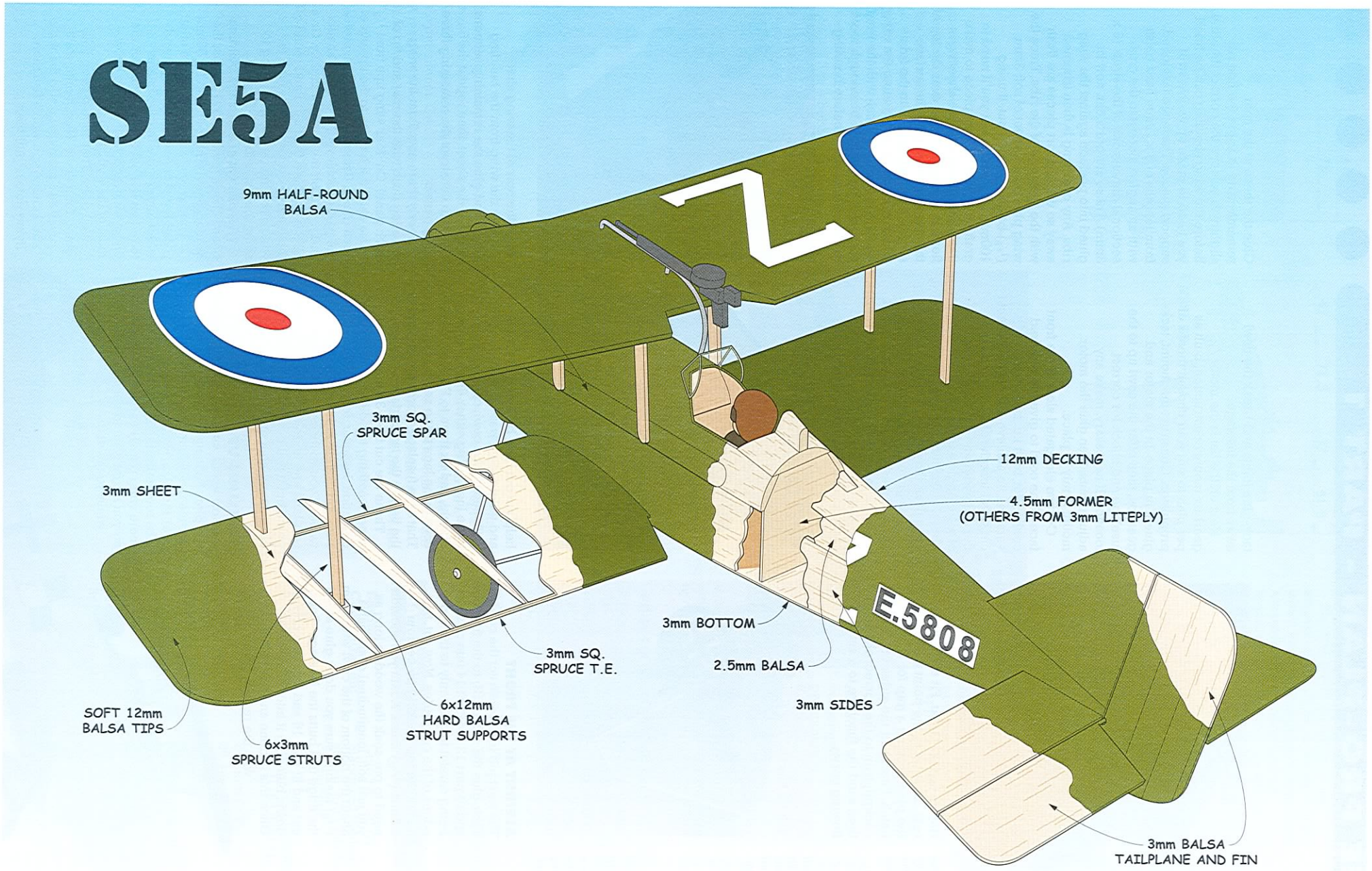
Start by cutting out the fuselage formers and fuselage sides, including the tailplane slots. If opting for the i.c. version remember to cut the engine bearer slots into F2. Two electric options are shown on the plan, one using the Multiplex gearbox set-up, and the other using the MP Jet 2.33:1 gearbox (available through John Swain of Fanfare Products). So, you can make an informed decision as to which electric power source to use, bearing in mind the Multiplex is a packaged unit that includes gearbox, motor and prop - the cheapest set-up on the market. The prototype used this latter combination and proved a very good all rounder. However, if the weight of your model (including batteries) is greater than 24oz then mild aerobatics will become difficult to perform and as the battery pack starts to run down you may feel uncomfortable with the characteristics. Unfortunately with this unit there's no way of modifying gear ratio, prop size or motor, whereas the MP Jet unit has numerous gear ratio options, ranging from 2.33:1 to 4:1. A conventional prop adapter means you can experiment with different props and, if you wish, a 480 motor could also be installed. Suffice to say, the specification for the MP Jet version, shown on the plan, will give a better performance than the Multiplex unit. Getting back to the building, the larger hole in F2 is needed only if using the MP Jet gearbox fitted with a 480-size motor.



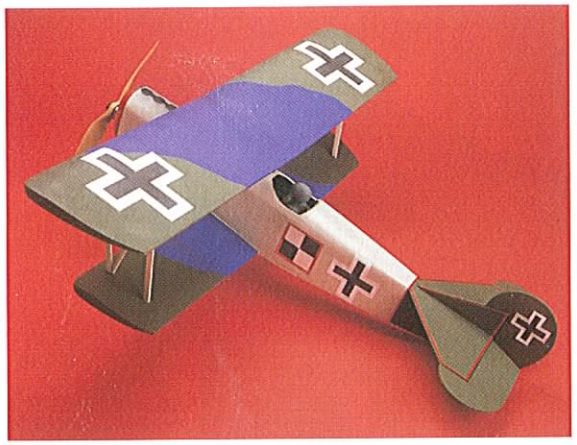
Glue F2 and 3 into position on one of the fuselage sides, then fit the other side. Add the top formers 4 and 5, noting that if building an i.c. version, it's advisable to make these identical to allow the fuel tank to sit higher in the fuselage.

Now chamfer the inside faces of the fuselage at the tail end in order to achieve a stern-post thickness of 3mm, i.e. that of the adjoining rudder. When this is done carefully pull the ends together, check alignment and glue. Fit the final formers 6 and 7 and the forward lower decking between the cowl and wing leading edge. The upper, forward, rolled decking can now be fitted. This is cut from 2.5mm ($^3/_{32}$) soft sheet balsa and although the radius of bend is quite tight, the wood should not need pre-soaking. The tapered rear side panels can now be fitted (SE5 only) and the top face trimmed flush with F6. Chamfer the top rear decking to a taper and glue into position.

SE5A



Designed by TONY NIJHUIS

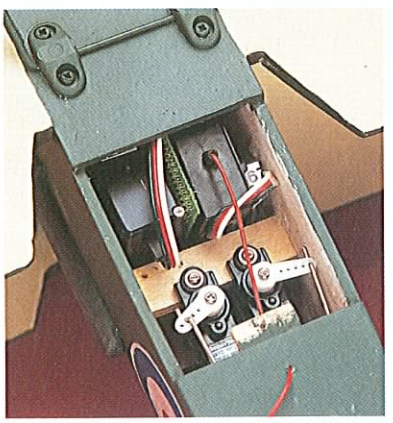


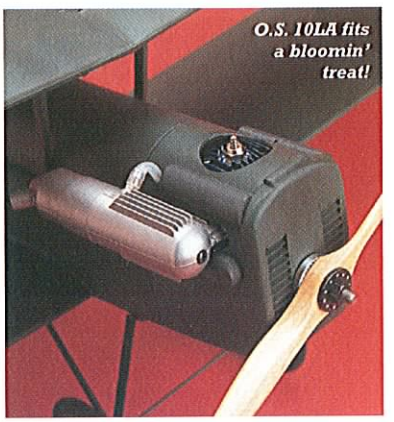
Construction of the DVII practically mirrors that of the SE5 - easy!

Happy so far? Great. Fit the bottom rear decking to the point indicated on the plan, leaving a gap for the access hatch. Finally, fit the sides of the cockpit, trim to the correct shape, then sand the fuselage to a smooth, flowing curve.

Neat little DVII tail incorporates an authentic balanced rudder and elevator.

Rudder and elevator servos sit inverted and are accessed by a small hatch on the underside of the model.





ALRIGHT AT THE FRONT

The next job is to construct the cowl. Tack-glue the sides (12) to the fuselage and fit part 13. Next, fit 14 into position, being careful to glue only to the top edges of the cowl sides. Now cut, trim and fit the top decking piece from 2.5mm ($^3/_{32}$) balsa. Again you shouldn't need to pre-soak the wood as long as you use soft, longitudinal grain balsa. Sheet the bottom of the cowl with 3mm ($^1/_8$) making sure you don't glue along the edge that butts the fuselage. Cut out and fit part 16 and sand the cowl down, blending it into the fuselage. Once this is done and you're happy with the results, gently cut the tack-glue joints and break the cowl away from the fuselage.

Next on the list is the motor / gearbox mount construction, built as per plan to suit your chosen means of propulsion. Construct the mount, tack-glue it in place, fit the motor and gearbox, then offer the cowl up to the fuselage and check for correct location. If necessary, make any adjustments, then glue the motor mount firmly in place.

Cut two elongated slots in the front face of the cowl to give the required cooling for both i.c. and electric versions. To achieve the louvred effect I cut small lengths of $^3/_{64}$" birch ply to the slot width and then inserted them at a 45° angle with a pair of fine tip pliers. Make sure the lengths form a snug fit so they're all held in place prior to gluing. This doesn't take long... my wife made yet another unexpected entrance into the workshop at this point and pronounced that I was really 'sad' going to that much detail - you can help me out here by doing the same and telling me it was worth it!

To secure the cowl, cut and glue three lugs, using either 6mm liteply or obechi, and fix them to F2. Attach the cowl to the lugs using servo screws. That's the fuselage finished - next on the list are the tail surfaces.

These are cut from 3mm balsa sheet... nothing too difficult about this operation, however, for the SE5 make sure you use the lightest possible wood. If you wish you can fix the tailplane and fin to the fuselage at this point, but it will be easier to cover the fuselage without them in situ.

PANELLING UP

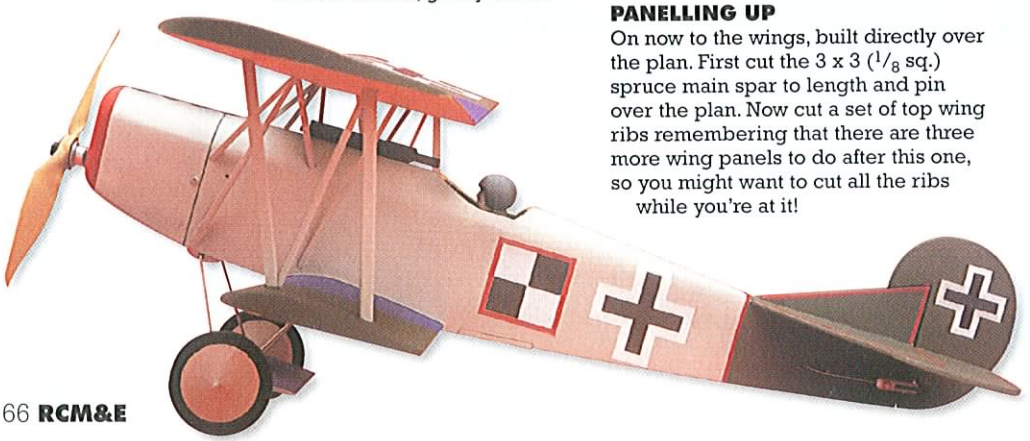
On now to the wings, built directly over the plan. First cut the 3 x 3 ($^1/_8$ sq.) spruce main spar to length and pin over the plan. Now cut a set of top wing ribs remembering that there are three more wing panels to do after this one, so you might want to cut all the ribs while you're at it!

Glue the these to the spar remembering to angle the first rib slightly to achieve the correct dihedral. Before the wing sheeting can be fitted you need to make up twelve strut support pieces. These are fashioned from lengths of 6 x 12mm hard balsa with an angled slot cut to the cross-sectional dimensions of the struts (6 x 3mm). These supports can now be glued into position against the wing ribs. Any overhang is then trimmed away so the support pieces are flush with the top edge of the ribs. Trace the wing plan onto a sheet of soft 3mm ($^1/_8$) balsa and cut it out. If using 100mm (4") wood then you'll need to graft on another 25mm piece to make the width. Check that the sheeting is flexible enough to bend over the top of the wing ribs (dampen the surface slightly) and apply glue to the front 20mm of each rib, positioning the wing panel edge so it sits flush with the front of them. There should be enough room to glue 50mm of rib before bending down the rear of the wing sheet. Remove the wing from the building board and glue the remaining sections of rib to the sheet, then repeat the above to construct the remaining three wing panels.

Nearly there now. Trim the wing sheeting flush with the root and tip of each panel. Cut four wing tips from $^1/_2$" balsa and attach these to the tip end of each panel. Using a razor plane, profile the part to achieve the desired shape and round off the corners slightly. Give all the panels a final sand and round off the leading edges. Cut through the wing sheeting on the lower wing to allow the struts to pass through.

With one panel flat on the building board check the dihedral against the second panel. There should be 50mm (2") under one wing tip with the other panel flat. Adjust the root angle and when happy glue the two halves together. Repeat this exercise for the other wing, and what do you know - most of the build is finished.

Well done. That should keep you going for a while. Next month we'll cover and paint them, add the radio, and indulge you with a few more flying notes. Until then...



DOGFIGHT DOUBLE

TONY NIJHUIS WRAPS UP THE BUILD OF RCM&E'S BATTLING BIPLANES - THE SE5A AND FOKKER DVII

The geometry of the top and bottom wing is all-important - do make sure you get it right!

Last month we looked at the main construction for this feisty pair of truly vintage warbirds. Hopefully you're well on your way to finishing the airframe(s) - no doubt the prolific builders amongst the RCM&E faithful may already be there, waiting patiently for this conclusion to the build. Guess I'd best get on with it!

As we're dealing with a one-piece airframe it's better to cover all the sub assemblies separately then build the model ready for painting. The bottom wing is the exception to this rule and can be fitted to the fuselage prior to applying film. With the lower wing in place a small length of 3mm fuselage under-sheeting is glued abutting the trailing edge to provide a 'rest' for the forward hatch retaining lug. The hatch itself should be fabricated as detailed on the plan.

Cut out the two undercarriage support blocks and glue into position, trimming them flush with the open framework when dry. Finally, use a sanding block to blend the wing leading and trailing edge into the fuselage underside.

Give yourself a pat on the back, for the model is now ready for covering!

MEDIUM CHOICE

The prototype was covered using Easycoat iron-on film, however, this did add unnecessary weight to the back so in hindsight I should have covered the rear end with Litespan. You could use Litespan to cover the whole model or (even better) a good old-fashioned tissue and dope job. Okay, with that done, assemble the model in the following sequence:

1. Glue the tail and fin into position, removing any covering that may impede a good glue joint.
2. Fit the rudder and elevator.
3. Make up the eight wing support struts from spruce, as detailed.

These little models really look the part in the air.

4. Fit the four outer struts to the bottom wing and attach the top wing. Before gluing into position make sure the geometry is set in accordance with the plan. Getting this right is important, so pay particular attention here.
5. Glue the outer struts into position using cyano.
6. Fix the four inner struts into position making sure they're parallel with the outer struts. If you've film-covered the model be

sure to remove the covering where the struts glue to the fuselage sides.

7. The detailing can now be applied as shown on the plan, i.e. dummy exhaust tubes etc., removing any covering at glue joints.

UNDERCARRIAGE

Although not difficult, constructing the undercarriage does require a little patience. Bend a single length (450mm) of 16swg to form the main legs (six bends in total) and make sure there's at least 9mm ($^3/_8$") overlap with the start / end before removing any excess wire. Now bind the overlap with fuse wire and solder. Cut the main 14swg axle to length, then bind and solder it in position.

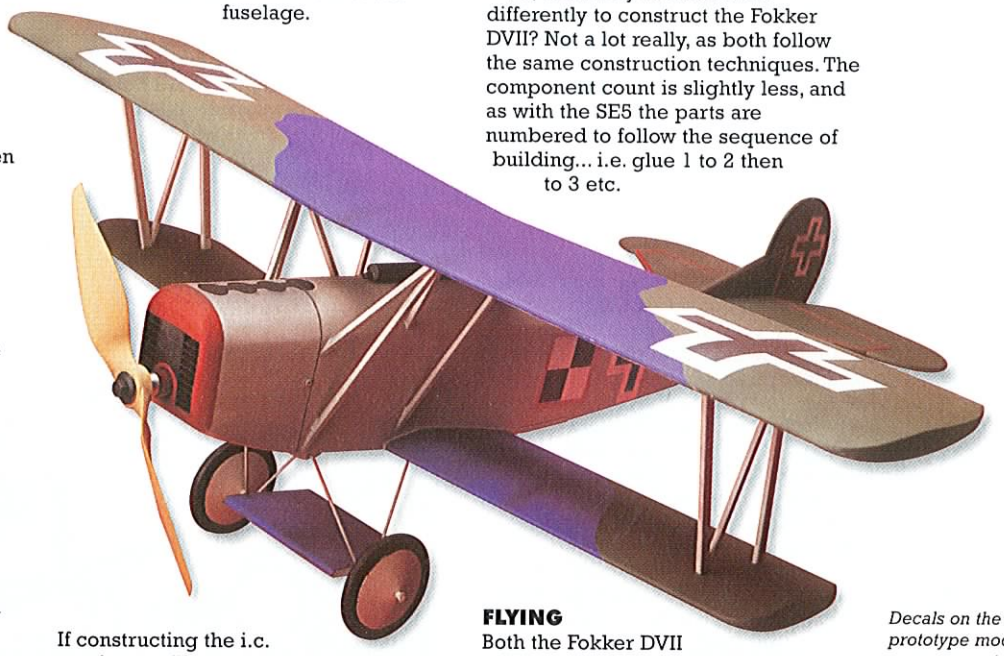
The wheels are cut from 6mm liteply; if you possess a hole saw that attaches to a drill then use this to make them, it certainly helps. Radius the edges of the wheel to give a smooth curved profile. Now glue either a piece of plastic or brass tube through the centre of the wheel to create a wheel bearing, making sure there's sufficient overhang to accommodate the conical hubs. To make the hubs, just follow the details on the plan. When complete, slide them over the bearing tube and glue the circumference edge to the wheel. Trim the bearing tube overhang to a minimum of 2mm and there you have it... a set of scale wheels almost ready for painting. To seal the tyre part of the wheel give it a couple of coats of sanding sealer before applying a matt black finish. Use screw collets to fix the wheels to the axle.

If you wish to you can apply some strut covers, made of 3mm x 3mm balsa strips. However, bear in mind that the undercarriage has very little spring; in a heavy landing the wire will bend and the strips will either come off, or break. To secure the undercarriage to the model use commercially available plastic saddle clamps in the positions indicated.

If you've used a film covering, apply a coat of Prymol etching primer to the film surface, after which, the model can be brush painted using Humbrol enamels. You can either paint the decals on or use Solartrim to construct them. Alternatively (as on the prototype) you could create them using a computer software package such as Corel Draw or AutoCAD and print them out on sticky-back paper. This works very well, but remember to seal them with a light spray varnish to protect the colours against water or fuel ingress.

FITTING OUT

Due to the size of the model, micro / Naro servos and a micro receiver are required, fitted and accessed via the hatch in the bottom of the fuselage.



If constructing the i.c. version you'll need to install the receiver battery and fuel tank before fitting the servo bearers.

When installing the motor / engine, remember to take account of the side-thrust. For the i.c. version try and keep the cowl as intact as possible, to help maintain its rigidity. For pushrods use either 16 or 18swg piano wire with 'Z' bends on the servo end and nipple links at the control end.

For the electric version the 20 amp speed controller can be placed in a number of locations; just make sure the battery wire is of sufficient length to make the connection. If you want to fit a pilot then make him easily removable; particularly important for electric version in order that the NiCads can be accessed.

All-up weight of the electric model should be around 24oz, and for the i.c. version, two or three ounces lighter. With the electric SE5 you'll probably have to add nose weight to achieve the C of G, despite being selective with the wood. Alternatively you could add the necessary weight by installing the MP Jet gearbox and a heavier 480 motor. The choice is yours. Note that the C of G range is slightly further forward on the Fokker DVII than the SE5 due to the smaller bottom wing.

So, what do you need to do differently to construct the Fokker DVII? Not a lot really, as both follow the same construction techniques. The component count is slightly less, and as with the SE5 the parts are numbered to follow the sequence of building... i.e. glue 1 to 2 then to 3 etc.

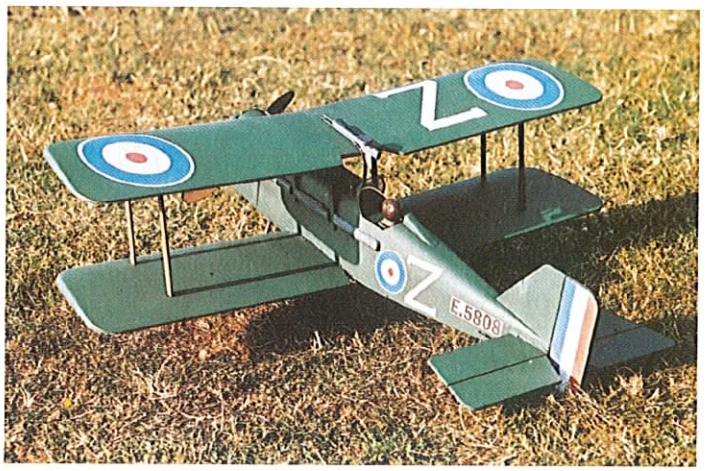
FLYING

Both the Fokker DVII and the SE5 have similar flying characteristics so I'll generalise here. The first thing to mention is not to fly these models on a windy day. Like any biplane they can become a bit of a handful, so be warned. Choose a nice calm one.

The second thing to note is the undercarriage, which on this size of aeroplane seems more of a hindrance. On landing I always seem to scrape the nose along the ground, or worse, flick the model onto its back. I've been told this is a common trait with W.W.I biplanes and small ones are even worse, so don't blame yourself if you can't get the landings right.

While we're on the subject of handling, it's better to hand-launch these aircraft as you'll have more success. Trying to take off from the ground will require a strip with very short grass, and even then the model will tend to ground loop at every

Decals on the prototype models were generated on computer and printed out on sticky-back paper.



Ground handling isn't the best so take Tony's advice and get a good hand-launch. Once airborne though...

opportunity, so be warned, the odds are stacked against you. Since we're agreed that we're going to hand-launch - go seek a helper to do it for you. All that's needed is a firm throw and the model should head skywards with very little sink (assuming the model achieves the design weight). No doubt some trimming will be required during this first flight, so gain some height first. Once trimmed the model should fly hands-off, but the nature of biplanes means that correction may be required from time to time. Don't be too concerned if you're not used to combining rudder and elevator control, you'll find it very similar to your usual bank 'n' yank model. However, with rudder as the primary directional control the agility is very good, especially at low level where flat turns can be safely achieved. What you don't have, though, is direct control over the 'rolling' motion from side to side. To control the roll you have to change direction, so be aware of this.

These models have a large wing area in comparison to their size (also a lot of drag!) so they can be flown reasonably slowly. Weight will define the models performance, especially so with electric versions. The 24oz Multiplex arrangement (noted on the plan) may limit the looping capabilities, whilst using the MP Jet gearbox and 6V motor option will give better performance.

This dogfighting pair are quite forgiving but if you want to really stick stir, do it with a fair amount of height until you gain confidence. Landings are straightforward but do require short grass and a bit of luck to keep the model on its wheels.

Just a final point on the C of G; don't be tempted to experiment with a too rearward position in order to save weight. You'll probably get away with it on a calm day but the model will bite badly if there's any wind about. When the SE5 was flown with the C of G 70mm back from the leading edge I managed just two minutes before she flicked in from height, fortunately with little damage.

So, there you have it - two fun models designed with everyone in mind, including those who like to build a pretty static model. If you make a good job of it you never know - the wife may let you put it on the mantelpiece! Whatever you do, enjoy.

Make a good job of it and who knows, the 'good lady wife' may let you display it on the mantelpiece... Well, you can dream!