Full-size plan feature *by Mike Roach*

I am the *Walrus!*

An impressive electric scale model for indoor or outdoor operation, designed by Trevor Hewson with plan and notes by Mike Roach

ALL ABOVE: Model looks absolutely wonderful in the air - this is Mike's camouflaged version. Photos by Trevor Hewson.

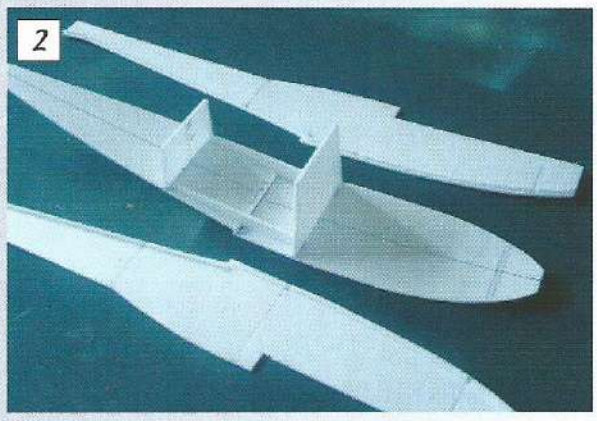
I have long admired Trevor Hewson's Supermarine Walrus as it makes its slow and stately way round the various indoor halls we fly in. It has a perfect 'sit' in the air and seems to fly, turn and land as if on rails, but I'm assured that this is all down to pilot skill... Anyway, I got tired of waiting for him to draw up a plan and get it published, so we agreed that I would do the drawing and put the article together, while he sat back and got on with another indoor gem (actually, his granddaughter, Annabel, filled this spot nicely!), giving me the perfect opportunity for me to make a second version: perhaps we could fly in formation round the Calshot Velodrome? I'm not a great fan of yellow aircraft but there are a large number of camouflaged and all-silver options listed on the Net and I really do like the painting and decorating process. So, over to Trevor to explain his design:

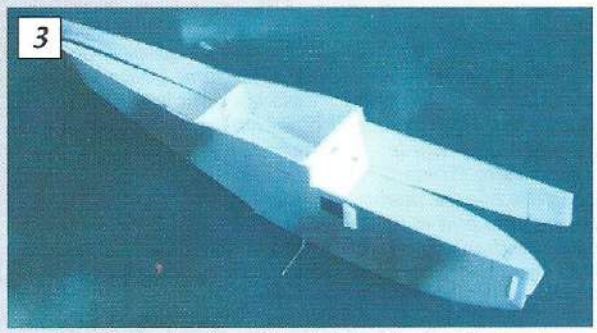
As the 2002/2003 winter season approached, I felt the need for something different for the coming indoor flying sessions. Having been pleasantly surprised by the performance of the SE5a, (30" span, 7 oz., GWS gear), I tried to think through the secrets of its success and decided that a reasonably compact model using a heavily cambered section on a lightly loaded wing was a summary of the key ingredients for indoor scale-like flight. Without getting involved with expensive ultra-miniature equipment, I couldn't see how I could improve much on the weight of the SE5, so the wing area ought to be much the same, too. When I came across the Walrus, it seemed an ideal opportunity to build something dimensionally similar to the SE5a, but totally different in character.

Typing 'Supermarine Walrus' into Google turned up a few full-size pictures and a couple of reviews of plastic model kits. Eventually, on *http://www.military.cz/british/air/war/other/walrus/walrus.htm* I found a three-view. The resolution was not very good, but, nonetheless, I printed it out, worked out a scale factor to bring it up to about 30 inches span and set to work.

Boat building

This aircraft doesn't really have a fuselage, more of a hull. Fuselage sides were cut out of Depron in the normal way, followed by a couple of bulkheads fore and aft of the wing seat. One more bulkhead was needed, positioned so that the sides adopted the right sort of curve when the nose was pulled in, then the tail ends were pulled together. Paper patterns were needed to work out the shape of the underside panels (chines?) and all of a sudden, it





was looking pretty boat-like. (*Actually, the Walrus has a more complicated 'reverse chine' hull shape than the normal hard-chine: there is a flat section that changes abruptly into the 'V' shape and this scale feature is shown on the plan. It's easy enough and probably stronger to make the flat fuselage floor but the 'V' section is rather more difficult. I made a scale section from hot-wire-cut pink foam by cutting the curved profile and plan first, sanding in the 'V' shape, then gluing this to the flat floor. I've shown both methods, including the approximate shapes of the plain 'V' on the plan. MR).*

Bird bits

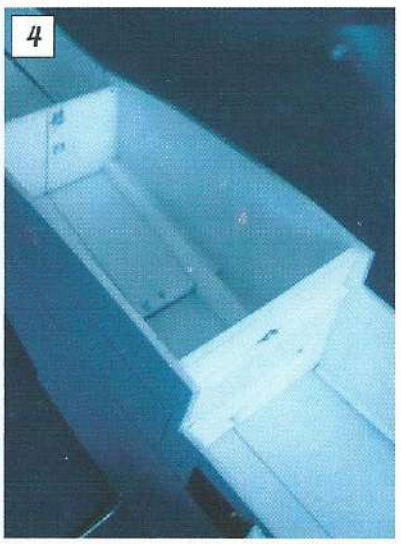
In many ways, the wings were the easiest bit. They were cut out from Depron and a section formed into them by rubbing each panel in turn over the edge of the kitchen worktop. The panels were left for a week or so to settle, just to make sure that the amount of camber was similar in all four panels. The bottom panels were butt-jointed with the characteristic sweepback and just a little dihedral, as per the full-size. The upper wing is swept back by the same amount, but has no dihedral. The trailing edge is relieved to clear the propeller. (*There is, in fact, a traditional centre section and the top wing has a little dihedral, but I didn't notice either until drawing up the plan. Trevor used odourless cayano on all joints, but I used epoxy on the wing dihedral - MR).*

If the wing was easy, the tail surfaces were anything but! Admittedly, part of the difficulty was self-inflicted as a result of accepting the challenge from a fellow modeller to do an internal linkage to the elevator. After much thinking and tinkering, the fin was fabricated from two thicknesses of Depron, held apart in the centre by two strips of 1/16" balsa. The gap between these strips formed a channel for a thin wire pushrod, which would connect to a 120 degrees crank mounted in the fuselage.

All that remained now was the problem of coupling the wire pushrod to the elevator. Some time ago, I read about a way of connecting pushrods to torque rods using heat-shrink sleeving. I remember being somewhat sceptical of the idea at the time, but now it seemed the only way of making a hinged connection within the 1/16" gap between the fin sides. Even so, it took a lot of experimentation and head scratching to get the geometry right and work out an assembly order for it all, but eventually everything seemed to work reasonably smoothly. After this, it was something of a relief to rig up a conventional thin wire snake connection to the rudder! (*I bought a Sullivan Gold-N-Cable from Channel 4 Models near Bournemouth, cut a smooth curved channel into the 3 mm Depron fin and faced it with some very thin Depron sheet I got from Flitehook. The outer cable was then glued into the channel and taken forward to F3. (All the other linkages are as Trevor's - MR).*

Techy bits

One of the first things I did after printing out the three-view was to work out what size prop could be accommodated without taking slices out of the fuse-



1: Kit of (some of) the parts. Always sand shine off Depron surfaces before gluing. Use odourless cyano or solvent-free glue. MR used epoxy on wing dihedral joints.

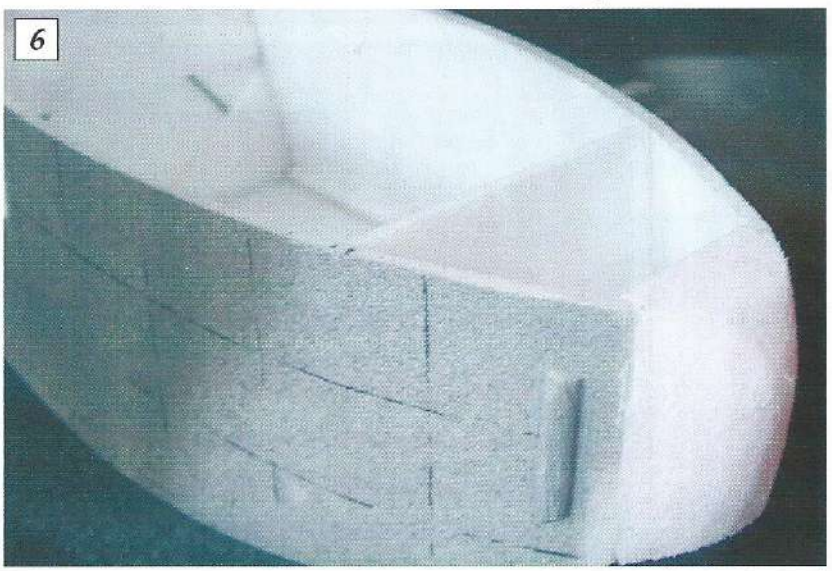
2: Join the fuselage floor with F4 and attach F2 and F3.

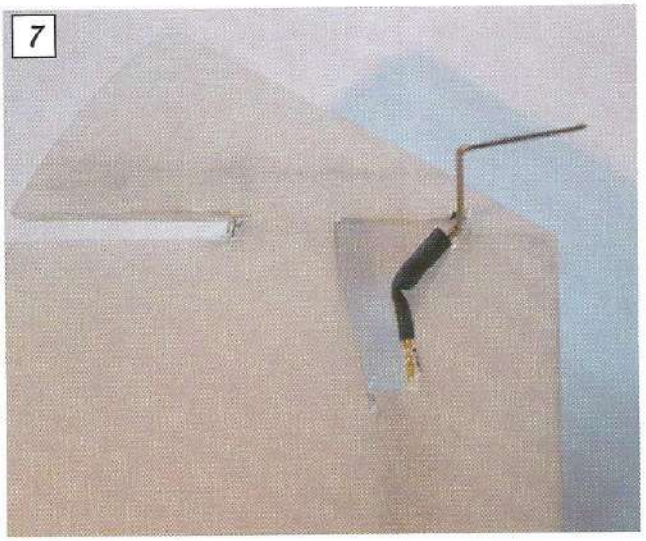
3: Now attach the fuselage sides.

4: Close-up of the main fuselage area.

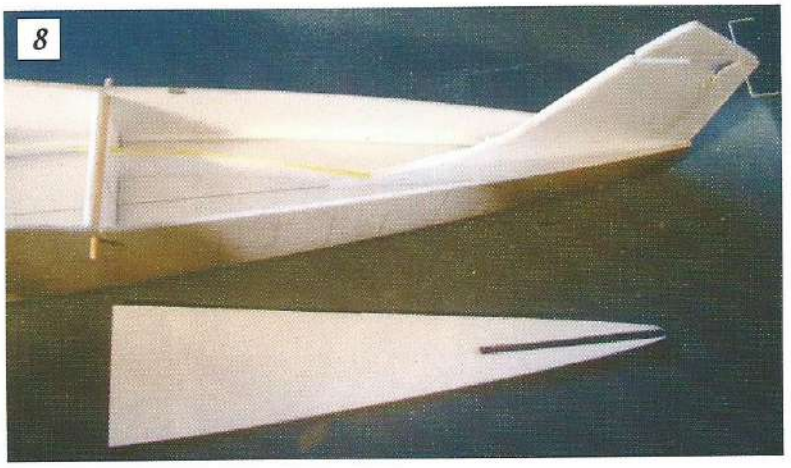
5: Undercarriage wire is sandwiched between F2 and doublers.

6: Pull in the sides to F1 and rebate in foam noseblock.

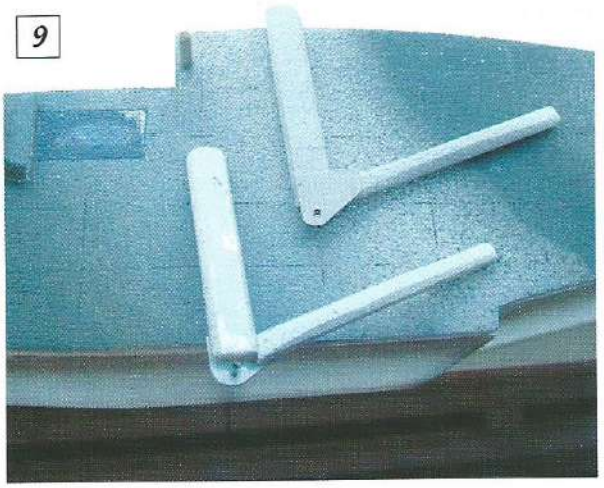




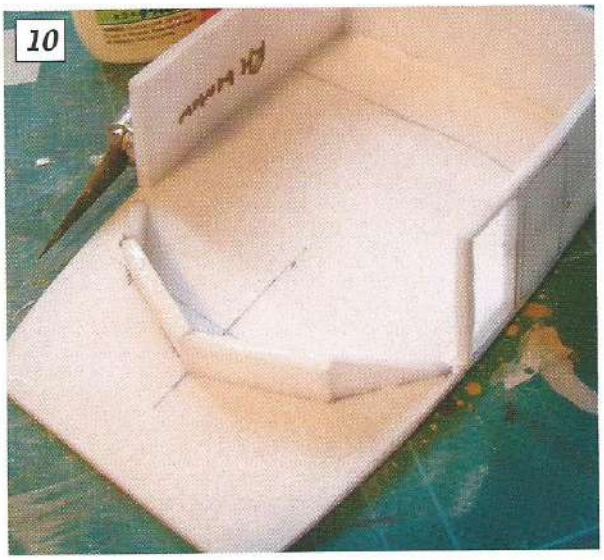
7: Make up the fin and fit elevator cable.



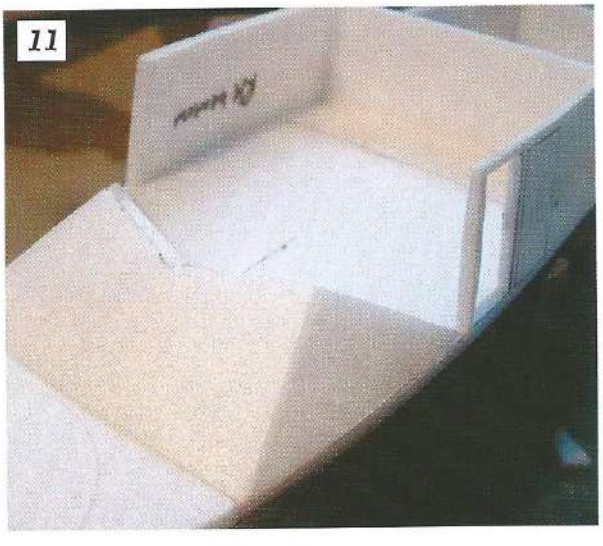
8: Glue the fin into the fuselage. Don't fit the top until all linkages are in place and checked!



9: The undercarriage legs are attached to a ply bearer plate, but are free to flex (or they'll break off in your first bumpy landing).



10: The cockpit/radio hatch is built up from Depron. The 'open' window is to show off the pilot.



11: The glacis plate. Note the crew hatch being cut into F5.

lage. With my chosen scale factor, it seemed that, if I cheated just a little with the thrust line, I could squeeze in a 7" prop. After making a few enquiries, I was directed to the GWS website to find that, in addition to the well known IPS motors and gearboxes type A, B, C, etc., which are geared at 6:1 upwards, GWS had introduced two more versions with lower gear ratios, designated S1 and S2. Looking at the helpful chart on the back, it seemed that the S2 unit should work with their 7 x 6 prop so - one more decision made.

The rest of the on-board gear was as per my other indoor models, so now it was just a question of how to mount that motor in its pod between the wings. *The Walrus has a four-bladed prop, made, as was often the way pre-war, from two props on a shaft, rather than being lapped together. I discovered that two GWS 6 x 5 props would fit nicely onto the shaft, as long as there was a prop-nut in between them. (This reduces the overall diameter even more and still provides more than enough thrust from the S2 gearbox. MR).*

Strut stuff

I bought some 0.5 mm carbon rod for the outboard interplane struts and some 2 mm rod to support the motor between the wings. The pod structure is built around a balsa stick onto which the GWS motor unit slides, with two more short lengths of the same balsa stick glued across it. Carbon struts were then poked through these two cross-pieces, adjusted to appropriate angles and cyanoed in place.

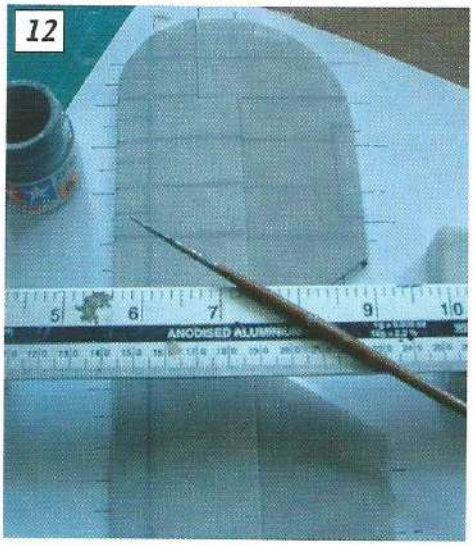
The next problem was the nose cone on the pod. I did try to use half an eggshell, but could find no way of trimming it without it shattering - ideas, anyone? Attempt number two was papier maché over an old spinner. It soon became clear that this was going to use a lot of paper and glue, so most of the paper was removed and a coat of epoxy resin applied. The result is far from perfect, but I tell myself that the full-size probably had a few dents in it too!

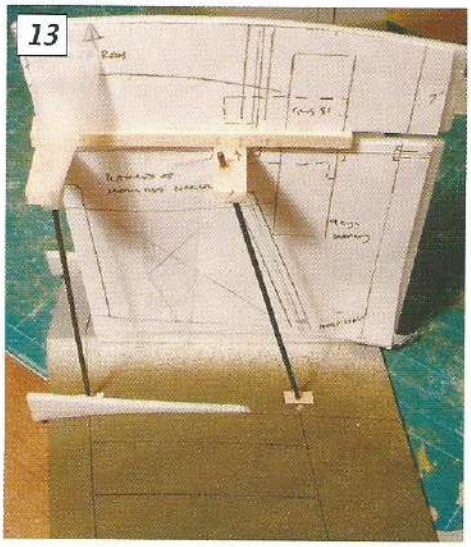
Finally, Depron formers and planking were used to build up the shape of the rest of the pod, and then the supporting struts were threaded through holes in the wings. Once everything was lined up, with the outboard struts in place, a few spots of cyano finished the job. *(I carved a pod from laminated soft balsa and push-moulded some acetate to make a top and bottom half, and a nose cone. It's a bit awkward sliding them onto the struts, but makes a neat pod without going into planking, boiled eggs or papier mache! - MR).*

Assembly

As I offered up the wing assembly to the hull, I was struck by what an improbable looking machine the Walrus is! If you can blot the hull out of your mind, the relative positioning of the flying surfaces is remarkably conventional. However, with that aft-mounted propeller sending its corkscrew blast over the tail and that draggy hull hanging down below like the gondola on an airship, one can't help but wonder.

One of the things I wondered about was rigging angles. The SE5a does fly a little tail-down sometimes, so I wanted to ensure that the wings of the Walrus were rigged at a slightly higher angle of incidence. Whilst checking the alignment of the tail surfaces with the wings, I temporarily attached the wings with





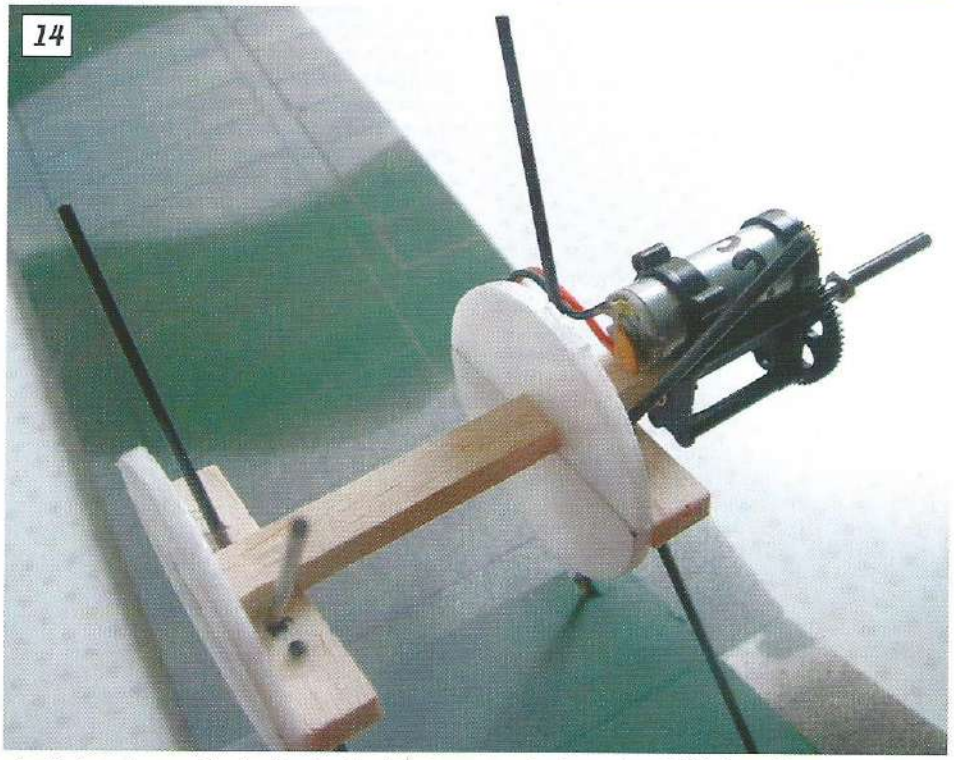
12: Most painting can be done prior to assembly. Here, rib and spar lines are being drawn in with thinned base colour. Actually, the RAF version should probably have 'sky' under-surfaces, not light sea grey as here. All the upper-surface markings were done with a fine-tipped black pen.

13: Accuracy is essential when building and fitting the engine pod. Use the front and side elevations off the plan to ensure the correct side and up-thrust are incorporated.

14: The 2 mm carbon fibre rod is expensive but light and very strong.

15: The finished structure. The Depron C1 and C2 discs provide the basis for aligning the acetate pod, or a foam built-up structure can be made. The motor is a force-fit on the mount and the leads to the speed controller go down one strut.

16: It's relatively easy to make a balsa former and stretch hot acetate over it.



elastic bands - and instantly decided that, at least for the proving flights, that was a pretty good way of attaching them! At that point I realised that, apart from a gaping hole where the cockpit should go, there was nothing much standing in the way of a test flight.

(The full-sized pod was rigged with right and up thrust. I've shown this on the plan and it works well on the model, taking away the need for lots of right rudder when the power is on and the throttle/elevator mixing that Trevor uses. - MR.)

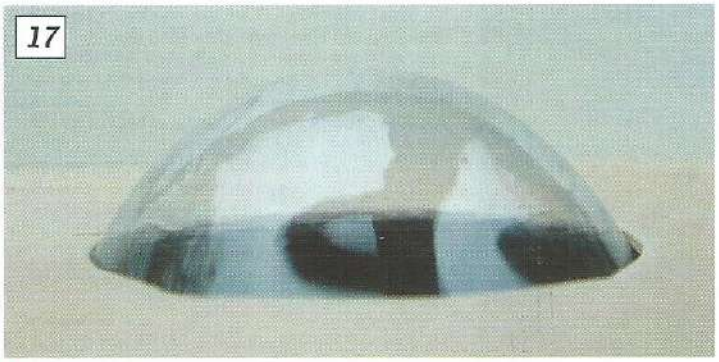
Test time

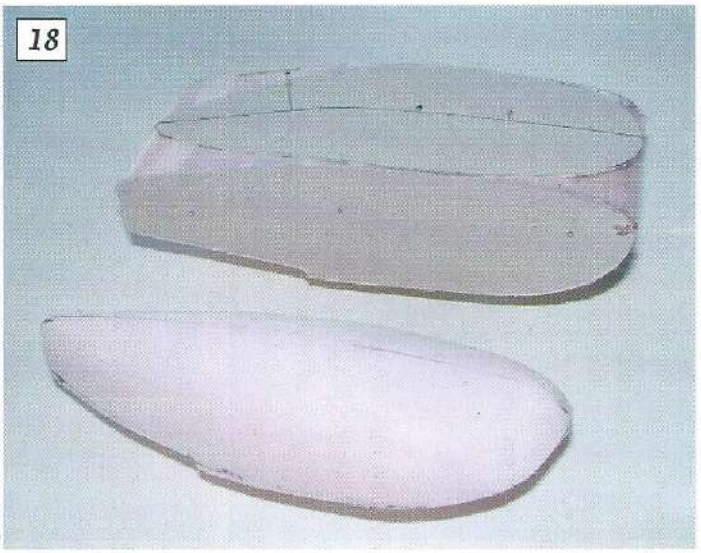
Having built a simple cockpit-cum-hatch, fitted some wheels and adjusted the battery to balance the model at a randomly chosen point, I put it in the car on my next trip to the flying field. Well, with an unknown rudder/elevator design and virtually no dihedral you didn't think I was going to do the first flight indoors, did you?

General opinion was that the c.g. was within a few centimetres of where it should be and so this unlikely little white ghost of a model was gently placed in the air with the motor running at about two-thirds throttle (I was concerned that, at full power, the high thrust-line and that draggy hull would result in too much downward pitching moment). The first couple of seconds were pretty lively, but once I had worked out that full left rudder trim was needed and that one third throttle was more than enough, things settled down and the Walrus cruised around quite happily.

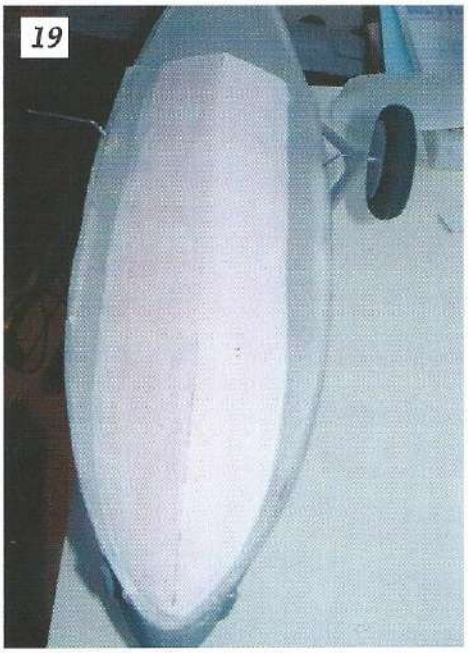
The turn response was remarkably positive and I felt that it should be flyable within our usual indoor venue. Just to make sure, I decided to see just how tightly it would turn. With more and more bank and more and more power, the little aeroplane was whirling round on the proverbial sixpence - when something went 'crack' and suddenly there was a lot of dihedral! Returning rapidly to cruise speed saw the wings partly flatten out and a safe landing was made. Inspection revealed no real damage - it seems that the outboard struts, although still attached to the wings, were no longer locked at the desired angle, so the whole wing assembly could distort in parallelogram fashion. That's why the full-size uses rigging wires, I guess!

(When I tested my Walrus at the Calshot Velodrome, I had the luxury of Trevor's advice ringing in my ears. I pushed the throttle forward, but had foolishly left the rudder on high rates. A few seconds later I managed to land and changed to a more sensible setting. A second go in the company of various 'Dizzies' and 'Shock Fliers' proved that my Walrus flew and was controllable, but that I needed a quiet five minutes to prove it! As is often the way indoors, everyone suddenly stopped or flew into each other and the 70-metre hall was free.





17: The pod front was moulded separately.
18: Wing-tip floats are easy to hot-wire-cut from foam and a bit of sanding produces a very neat, lightweight and waterproof article.
19: The scale reverse chine hull is made from hot-wire-cut foam, glued in place and painted. The raw foam should be sealed with lightweight filler before painting.
20: A neat four-bladed prop can be made from two 6 x 5 GWS items. There's lots of room on the same prop shaft, and it's scale!



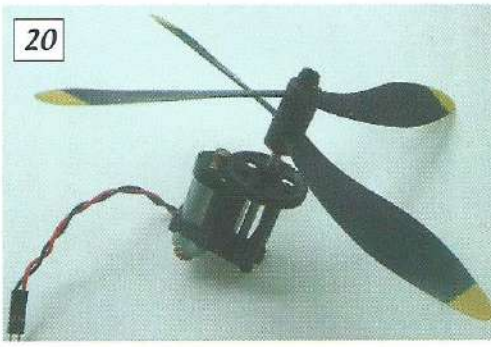
This time the 'Shagbat' circulated perfectly and, apart from some sensitivity to elevator and throttle settings, she flew realistically slowly and showed a sprightly pair of heels when necessary. She lands herself, as long as the motor is kept running, but doesn't like the transition to glide much. Keep the power on at all times! I had three or four very enjoyable flights, thanks to the welcome support of the Southampton fliers, as they kept clear. MR).

Finishing

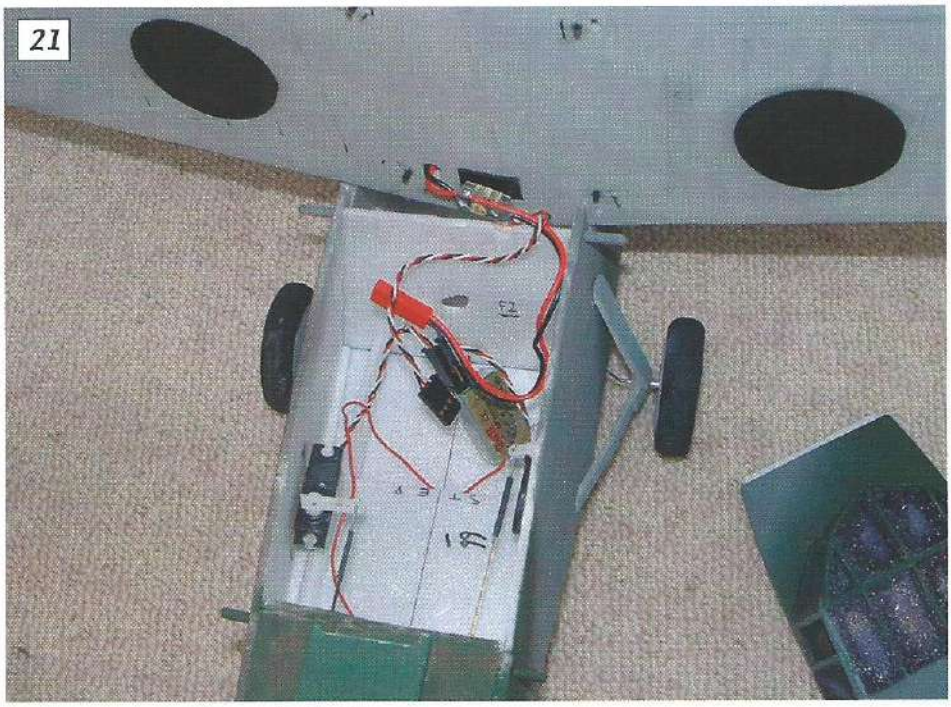
Readers of my reviews will know that I don't like the finishing stages of model building very much. However, it is much easier to commit to the effort involved once one knows that the model is worth it. So, after a successful test flight, it was time to return to the Internet to find a suitable colour scheme. I really didn't want a camouflage scheme - apart from stretching my very limited painting prowess, the concept of camouflaging remotely controlled models has always struck me as fundamentally flawed.

Eventually I stumbled upon this recently restored example in the RAAF museum. (Photo a). Perfect - one colour all over, and bright yellow to boot! The model was sprayed with Tamiya Acrylic paint, then the interplane struts were faced with Depron and rigging added in the form of Kevlar thread. Dummy undercarriage struts were also made from Depron and wheel discs cut from paper. The main cockpit windows are from silver trim, edged with a marker pen.

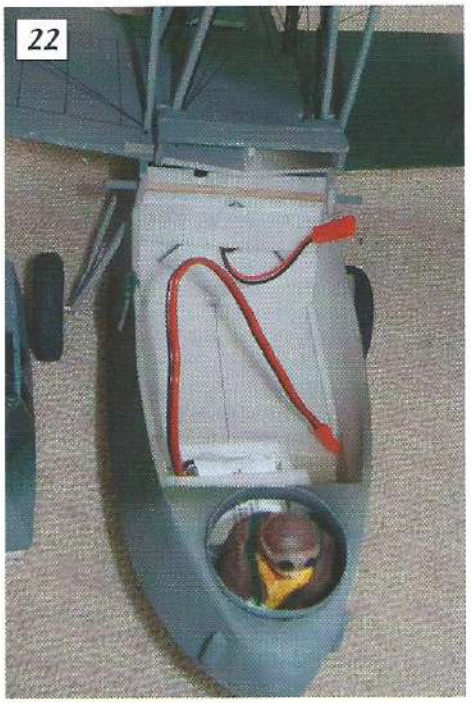
The dummy engine is made from Depron discs glued together and then the gaps between the cylinders were cut out. It was painted black and generally smudged with silver paint. I managed to find some old transfers for the fuselage roundels, but those on the wings had to be cut from trim. Mike Roach was good enough to cut me some tip floats from pink foam. Rub-down lettering was used on the fuselage, which, surprisingly, worked without problems onto the painted Depron.



(Now I DO like paining and decorating! As you can see from the photos, I did most of the work while still in the component stage and then fudged in the edges afterwards. I don't suppose that the paint adds more than 15 grams to the total weight so quite intricate work is possible.



21: There is masses of room for the Rx...



22: ...and battery connections!

My markings are done using my PC and Lazertran transfer paper, wetted out with MicroSet according to the instructions on the bottle.

I rigged the model with button thread, which is far too strong, but around the right diameter. I like using black thread for rigging (that's what you see when a real biplane is flying past) but most people use silver or grey because that's the actual colour of the wires. MR).

In finished form, the model flies very well - you can even judge the flying speed from the angle of dangle of the aerial wire. In cruising flight, the model turns well in spite of the lack of dihedral but I must admit that I have not tried flying the Walrus in the smaller halls. With most indoor models, the threat of an approaching wall can be countered by pulling a bit of up elevator and applying full power, whilst of course holding full rudder. This produces a sort of chandelle/stall turn, which is usually enough to get you out of trouble.

With the Walrus, though, this doesn't work because full power simply pushes the nose down so, instead of turning more sharply it merely accelerates towards the approaching wall. Coupling up elevator to the throttle has gone some way to countering the effects of the high thrust-line and the Walrus is now quite a relaxed scale cruising machine - just don't try to fly it like a fighter!

(Now then: it flies well enough to be a bit adventurous. I live right next to Christchurch Harbour where I sail a Laser every Sunday. Could a waterproof version to the same size, weight and power be made to operate off water? Watch this space!

There's also a new book on the Supermarine Stranraer and Walrus, by James Keightly & Roger Wallsgrove with illustrations by Bob Pearson. Yellow Series No.6113. MR). ■

23: The realistic engine is made from foam scraps and glued round the GWS gearbox. On the upper wing, dummy slinging points conceal the strut attachments.

24: (Photo a). The Australian Walrus, restored to its former glory. Notice how very angular it is!

25: Trevor's model, almost finished but after the first flight.