Dervish

build this lively aerobatic sportster

by C. M. WHITE

AFTER FLYING for a few years with gliders and lightly loaded general purpose sports models, I felt it was time to go for something a little more interesting. I had lost a lot of flying days thanks to windy conditions and so decided to design and build something with a higher wing loading capable of flying through those gustier days. I had just become the proud owner of a Super Tigre 46 which I decided to build around, and the *Dervish* was the result.

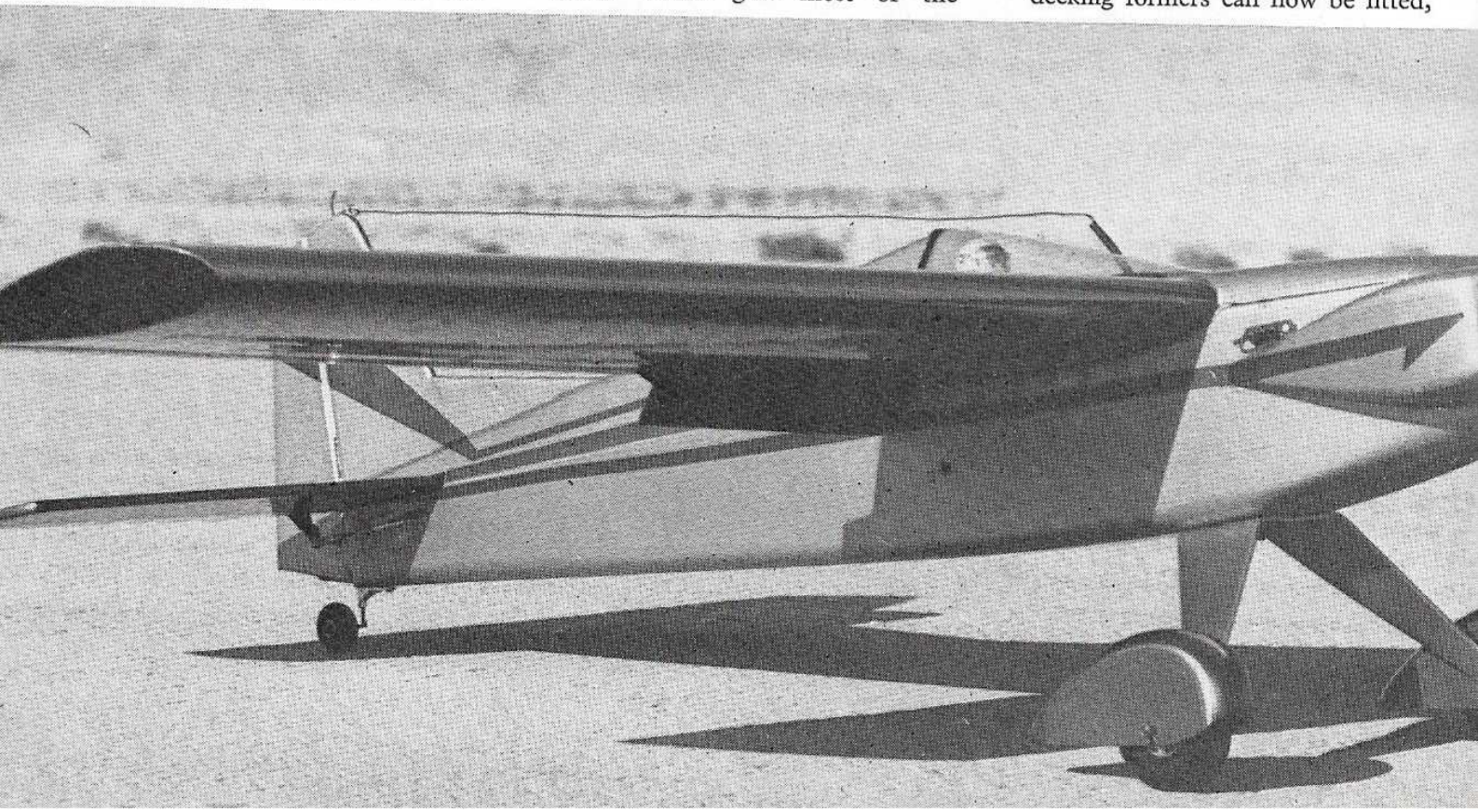
It was designed as an intermediate aerobatic model for .30 to .45 engines. It has not flown with a .40, but this size of engine should prove to be ideal as my O.S.30 pulls it around fairly well but does need some coaxing in some of the vertical manoeuvres. Some attention on the part of the builder to keeping the weight down may, of course, help a little.

CONSTRUCTION

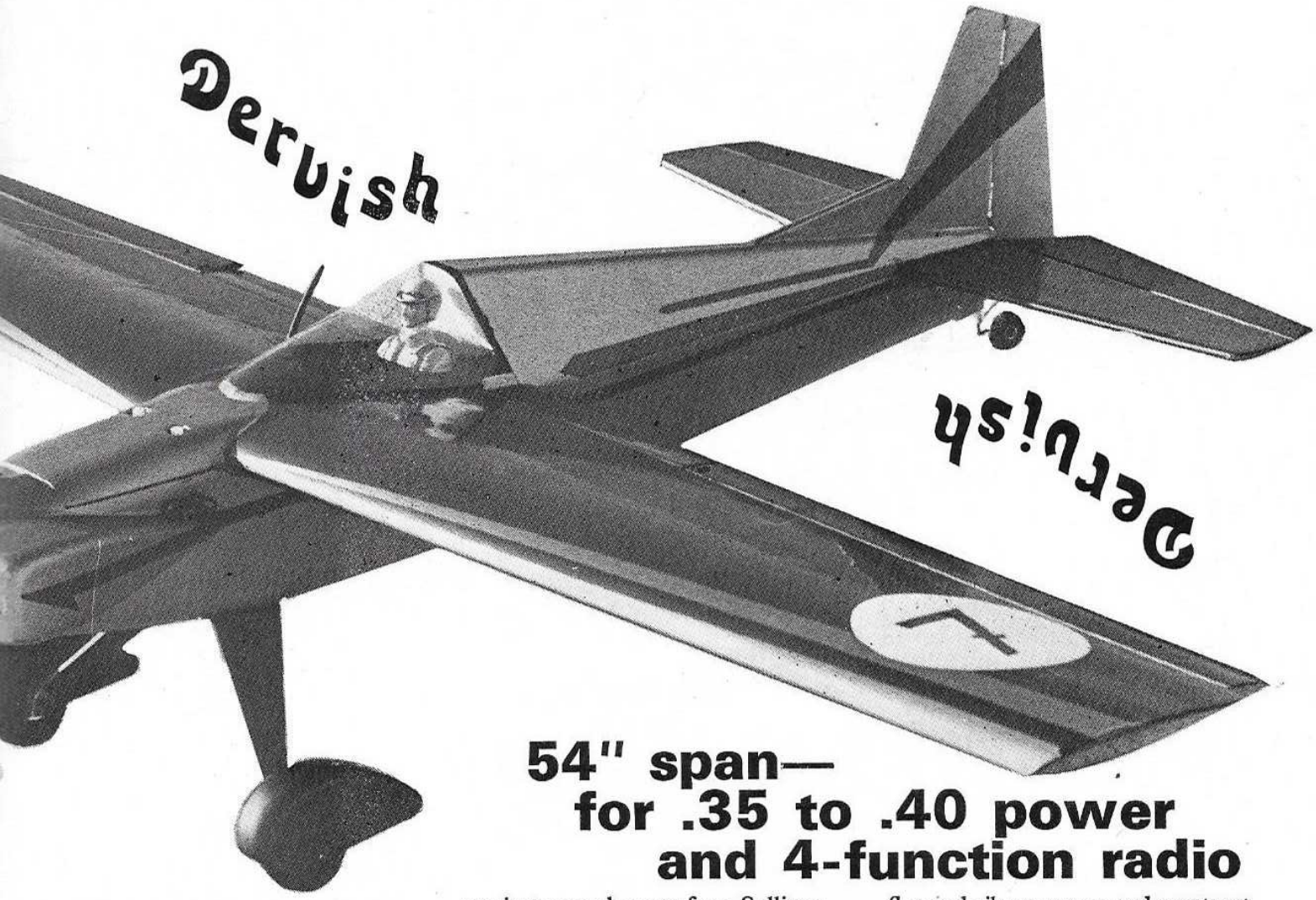
Fuselage

Contact adhesive was used to bond the doublers to the sheet sides, and PVA used for the triangular stock. These give most of the strength to the fuselage, so let them dry before fitting the formers F2 and F3 with epoxy. After drawing in the tail and fitting F1 with its triangular reinforcement, the ply u/c mount may be fitted and the underside of the fuselage sheeted.

I found it best to fit the tailplane at this stage, and also to attend to the elevator and rudder linkages. I used bowden cable linkages, binding the outer tube to $\frac{1}{4}$sq. balsa, which is in turn fixed to the side of the fuselage providing a straight run from servo to control surface. All the upper decking formers can now be fitted,



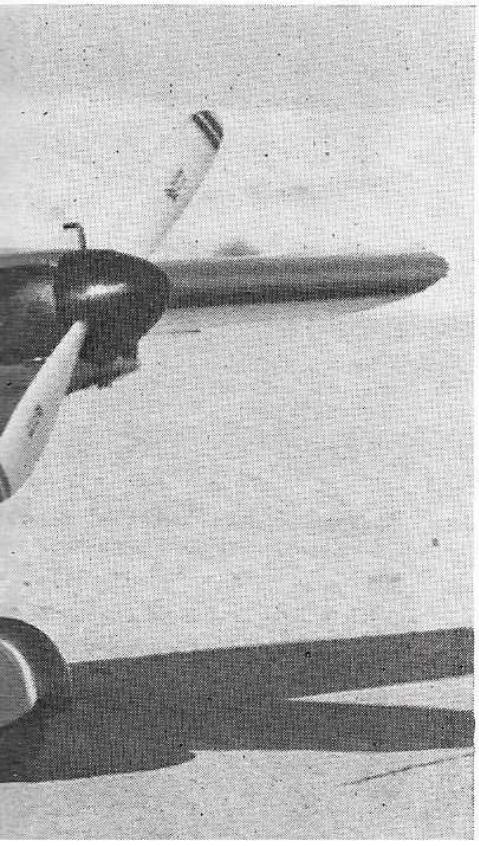
Dervish



54" span— for .35 to .40 power and 4-function radio

sheeted over and then the fin firmly glued in place. The tail wheel arrangement may seem a little weird but does its job well, the linkage disengaging from the rudder completely if the model ground loops.

Fit the engine mount and engine and decide upon the tank and throttle cable positions. I found that there was just enough room for a Sullivan 10oz. slant front tank on the prototype. Block up the engine's exhaust and carb. with tissue or similar and build up the cowl from ¼in. sheet. Some internal carving may be necessary to get a good close fit to the engine cooling fins, and make sure that the cooling air outlet is as large as possible. The u/c legs are bent from ⅛ dural sheet and bolted to the ply undercarriage plate. Bending dural is not that bad; details are included on the plan.



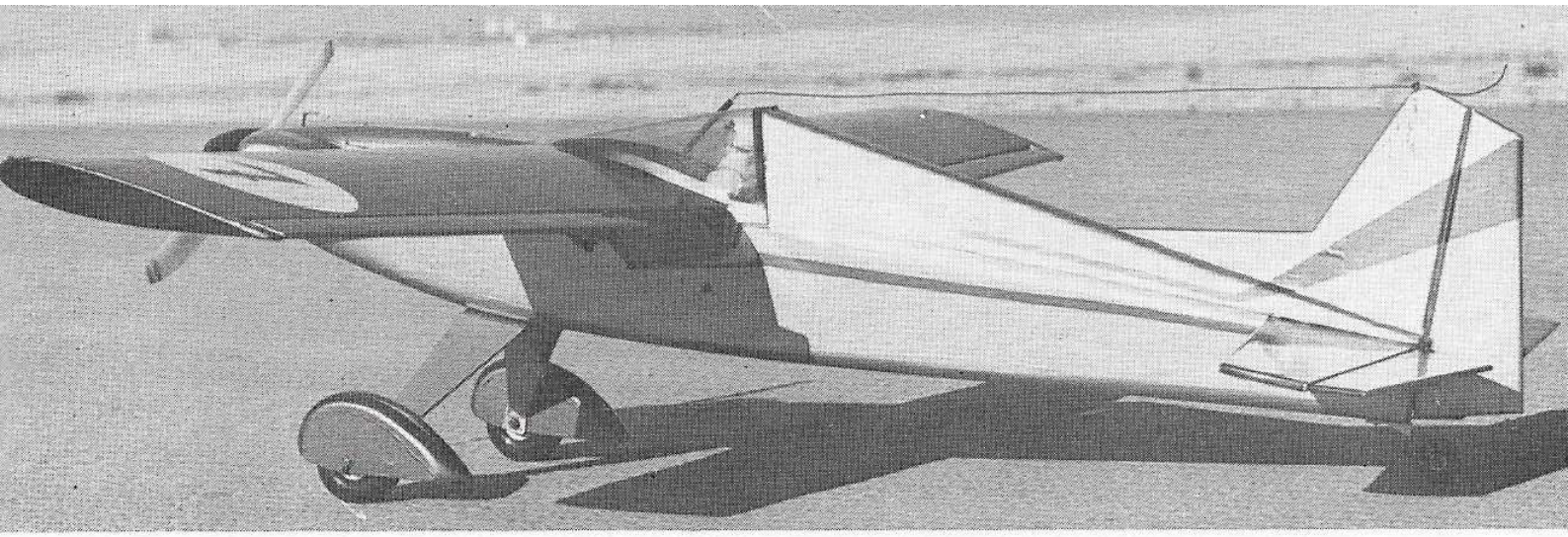
Wings

Make up the ribs by the sandwich method using the templates as described. Fit these to the bottom mainspar and when set add the top spar, false leading and trailing edges, followed by the spar webs and various gussets. Complete the top sheeting and cap strips, invert the wing and finish the bottom sheeting after pinning the wing down to ensure that no warps are built in. As the wing section is symmetrical there's no need to turn the plan over; the same wing drawing is used. Check the centre join of the wing panels, glue the panels together and reinforce the join with 4in. glass tape and resin on the top.

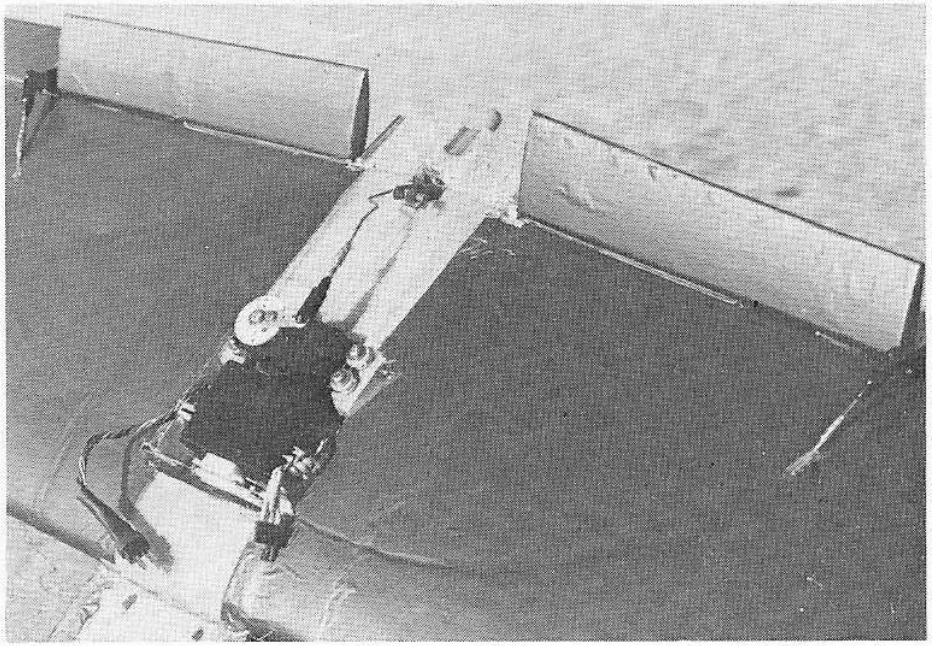
Turn the wing over, build in the flap and aileron servos and construct the boxes from ⅛ sheet, checking that the servos sit as deeply as possible into the wing so that they do not foul the fuselage mounted servos. Now a 4in. glass tape may be applied to the bottom of the wing, the wing tips added and the wing sanded.

Offer up the wing to the fuselage and hold it firmly in place with rubber bands while the canopy base and rear are fixed. The ½in. balsa tank hatch may now be carved out and epoxied firmly to the wing. As the hatch takes the wing retaining bolt, the wing-to-hatch join must be as close as possible to result in a strong attachment. Remove the wing, drill out F4B for the wing dowel and epoxy the dowel in place on the wing. Refit the wing and drill holes for the wing bolts through the tank hatch and the ply fuselage mount. Finally make up and fit the canopy screen from clear plastic sheet.

Aileron torque rods are used for the flap linkage, set up so that they move together rather than in opposition to each other. The flaps themselves are reinforced around the torque rod by an application of glassfibre finishing cloth and epoxy. Either linear or rotary servos may



The *Dervish* is seen above on its desert strip—a 'natural' setting, one might say. Below is a close-up of the centre section of the wing, inverted to show flaps, flap servo and aileron servo. (The rather 'agricultural' flap linkage has since been changed—see text.)



be used for the flaps, although a rotary type *must* be mounted on its side, otherwise an asymmetry will develop as the flaps are lowered. A rotary servo was orginally used in an upright mounting, and I thought that some inaccuracy in the flap hinging was the cause of a slight rolling tendency showing up in the model as the flaps came down. Later I figured out that it was the arcing movement of the linkage, and after positioning the servo on its side the problem ceased.

Finishing

I used plastic film on the originals, although any method would be suitable. Two layers of glassfibre finishing cloth and resin should be applied to the inside of the cowlings to add strength and fuel proof, while straight fuel proofer is used inside the tank bay.

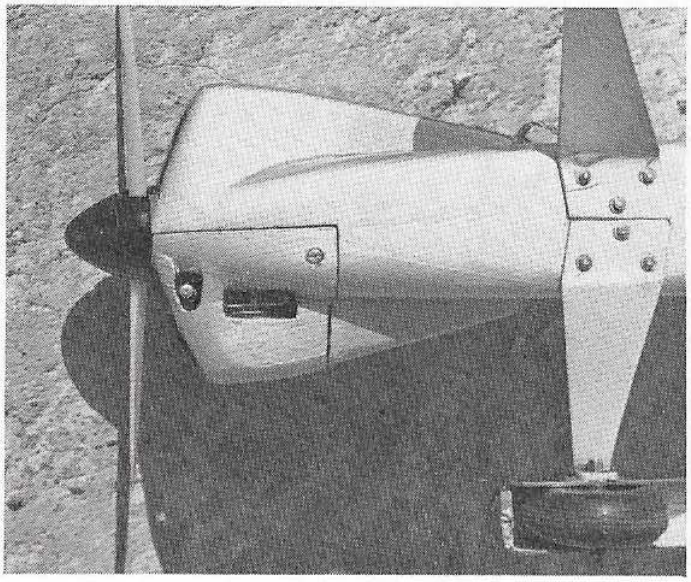
Juggle the radio gear about to get the c.g. where it belongs—I have flown the model with the balance point within the limits shown, but can't say anything about the handling outside those limits.

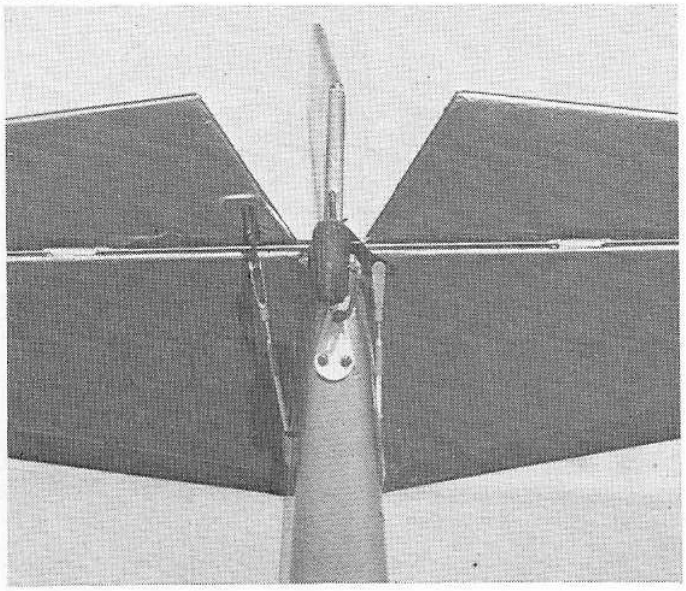
Most people will have noticed that the original is not shown with a silencer fitted. At the time these models were photographed I was flying from a desert(ed) strip in Bahrain, and summer conditions there (temperatures of 100°F and humidity levels of 95 to 100%) cause engines to lose so much power that the additional loss caused by a silencer cannot be tolerated. However, during the winter when conditions are more like British weather, a muffler is fitted.

Kicking up the dust

As I am only a Sunday flier, and a fair weather one at that, the aerobatic performance startled me somewhat on the first flight with the ST46. After a few minutes my legs were

Detail close-ups of nose and tail areas of *Dervish* show detachable cowl portion, and pushrod attachments.





DERVISH

jelly—you must know the feeling—and I was tottering rather more than usual. Best to keep it up there, I thought, and tried some aerobatics. Roll performance is good—fast and axial—and twinkle rolls no problem with the larger engines. Loops and hammerhead stalls?—easy, and Cuban eights are ego-boosting so get some under your belt as soon as possible.

On the second flight I tried the flaps, 20° first (I had marked the control movements on the transmitter) with the engine cut right back. The nose gently rose and she settled into a gentle glide. Easing on some power gave a good rate of climb while full power sent her rocketing up. I throttled back again and this time tried full flap. Full up trim on the elevator was now gently eased in and a high approach started followed by full power, 20° flap, climb power and overshoot. I got back some height to try the full flap handling with full flap and no power. No problems were encountered except when the speed had dropped to as low as I dared and I applied half power (to simulate a .30 engine); it seemed ages before the *Dervish* was really flying again! There is no lack of acceleration with the larger engine.

One thing must be said, and that is during a flapped landing (as with others) the *throttle* controls the *rate of descent*. To slow down, hold the trimmed position on the elevator and gradually increase power to arrest the sink rate.

During all this low speed flying, *Dervish* never actually dropped a wing—it only tried to after some fairly determined rudder flapping on my part. Two points to note; don't slow down too much with full flap and a smaller engine, and use *rudder* to pick up a dropping wing, *not* aileron.

Flaps-up landings are normal to most of us while, with practice, a flapped landing can be used to bring the model in right where it's wanted.

Dervish has proved great fun to fly but is not a beginner's model, especially when fitted with a .40 or larger. However, a .30 to .35 powered version will be suitable for someone with experience of aileron-equipped sports models.