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BY
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Not a completely scratch bu
Britain's top 'Copter man sh
a really practical helicopter f
commercial parts, well within

THIS model came about by accident, or rather as the result of one. I had reverted a Bell Huey Cobra back into a kit of parts the hard way. Although the fuselage was a write-off, the mechanics were virtually intact, apart from a bent main rotor shaft and broken blades. I had acquired a Jet Ranger fuselage with the intention of fitting Schluter mechanics but had never got around to doing it, so in the absence of a model to fly, the time seemed right. The requirement was for a lightweight simple model without collective pitch, using commercially available components, but most important, it should be quick to build. The prototype took just one week of evenings to complete construction up to the painting stage.

As the model was a bit of an unknown quantity, I decided to test fly it before spending precious time in applying a fancy paint job. The paint didn't go on for several months. I could say that this time was spent in development and testing, but the truth is that the model was such fun to fly that painting came very low on the list of priorities.

Although this model can be built from scratch by purchasing the various kit components, it is aimed mainly at the owners of Schluter models, Cobra, DS22 and Gazelle, the mechanics of which can be used virtually en bloc. The relatively simple, rugged Schluter mechanics and the pleasing lines of the Jet Ranger with plenty of potential for the scale builder make a natural combination. The design was to be as light as possible in order to have a good reserve of power, but not at the expense of a strong rigid structure. To this end, the front windows were not cut out, thus eliminating a lot of ply stiffeners around the front of the cabin. The prototype came out at 9½ lbs unpainted and subsequent models weighed around 10 lbs with paint. A spin off from the reduced weight is that the model becomes extremely buoyant with the standard Cobra main rotors necessitating a reduction of the rotor diameter.

As I wanted the model to be as lively as possible with standard mechanics, the increase in rotor speed resulting from shortening the blades speeded up cyclic response. But the most noticeable effect on cyclic response was obtained by lightening the stabiliser paddles. The centres were milled out to the dimensions shown on the plan, then filled with balsa and covered with some off-cuts of self-adhesive covering as used on the main rotors. A responsive model is a real asset no matter how inexperienced one is – ask anyone who has been in a tricky situation with the sticks hard over and the model lurching painfully off in its chosen direction. This model certainly is responsive, there being a definite feel between control input and the model's reaction. But all this is not at the expense of stability, the model being stable in the hover and easy to land even in windy conditions. Its ease of construction, lightweight, good throttle response and stable flying characteristics make it an ideal trainer, yet it has the potential to keep the more advanced flyers well satisfied.

Several examples have been built by friends from information sketched on the back of fag packets, but I thought a plan would be much nicer.

Fuselage Construction

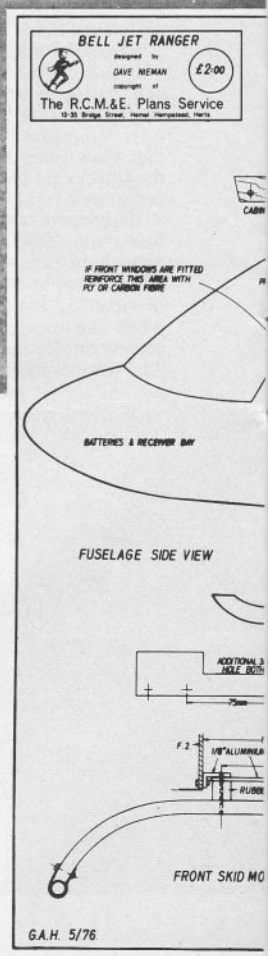
Cut out the openings for the side windows leaving a 2 mm lip – even if you do not intend to fit the windows this lip will help to keep the cabin sides stiff. Clean up the opening in the top of the fuselage and trim the cabin top to shape so that it is a good fit on the fuselage. If the front screens are to be fitted, then cut these out also.

Transmission Box

This is fabricated from ⅛ in. three ply. If you can lay your hands on some ⅛ in. five ply this is better still. Cut out all formers and don't be alarmed at the number of lightening holes, as the completed structure is very strong. As individual fuselage shapes vary, it is advisable at this stage to offer up F1 and F3 into their respective positions and sand to a rough fit. It is easier to do this now, than when the whole box is assembled. Glue 12 mm hardwood bearers to formers 2 ensuring that they are flush with the top edge. Stabilit Express is excellent for this job. Remember to make one left and one right. When set, assemble the box upside down on a dead flat surface, keeping everything nice and square. Although the box is only butt joined together, it will be bonded into the fuselage, so there is no need for any fancy joinery.

The standard Schluter bedplate and gearbox are used, but in order to prevent the bedplate from flexing when pulling down hard on the starting belt, an extra mounting hole is drilled as shown. A longer starting belt should be fitted as the mechanics are higher than normal. The Kavan belt, which is supplied for boats and measures 5 mm × 465 mm does nicely.

Full size copies of this plan, shown here at ⅙th scale, are available from R.C.M. & E. Plans Service, price £2.00 inclusive of V.A.T. and postage. Please quote Plan RC/1282 when ordering.



JET RANGER

ilt R/C helicopter, but ows how to put together for 10cc motors using the F.A.I. maximum weight limit

Offer up the complete motor-transmission assembly from inside the box and position as shown on the plan. Clamp temporarily and drill ten 3 × 20 mm holes for the mounting screws. Mount the assembly using socket head cap screws. Make up some 8 mm square washers from aluminium to prevent the screws from pulling into the bearers. Smear the shanks of the screws with Stabilit Express, push down through the bearers and tighten evenly.

Remove motor and gearbox but leave the bedplate attached to the bearers. The cabin top must now be fitted to facilitate transmission alignment. Glue in the ply plates for the cabin top mounting screws. Sand F5 to fit and bond to cabin top at the correct angle. Be sure to maintain the shape of the cabin top as this does tend to spread apart. Fit the top, drill holes and mount with 3 mm blind nuts. Mark position and drill 10 mm hole in the top for the main rotor shaft. Remove the top and insert transmission box and bedplate in through the top of the fuselage. It may require some juggling and stretching but it will go in. When it is properly in position, mount the gearbox and rotor shaft to the bedplate, attach the cabin top and move the whole box assembly to bring the rotor shaft into the centre of the hole in the top. Sand the formers if necessary, but be sure to maintain the correct shaft angle. Carefully tack the box in position, using 5 min. epoxy through the side windows. When set, re-check alignment and remove cabin top and the gearbox. Cut out the bottom of the fuselage from 5 mm behind F1 back to position shown. The hole should be about 180 mm long and full width between the longitudinal formers. Remove the bedplate and bond the box to the fuselage with resin and 1 in. wide lightweight glass tape. Drill two holes in the rear skid mounting plate and bond in place.

Push a point through the holes and mark the fuselage for the mount holes. Remove all traces of dust from the fuselage and give all the woodwork a coat of resin to fuel proof. Do not let it build up on the underside of the bearers as this will cause the bedplate to be uneven when fitted.

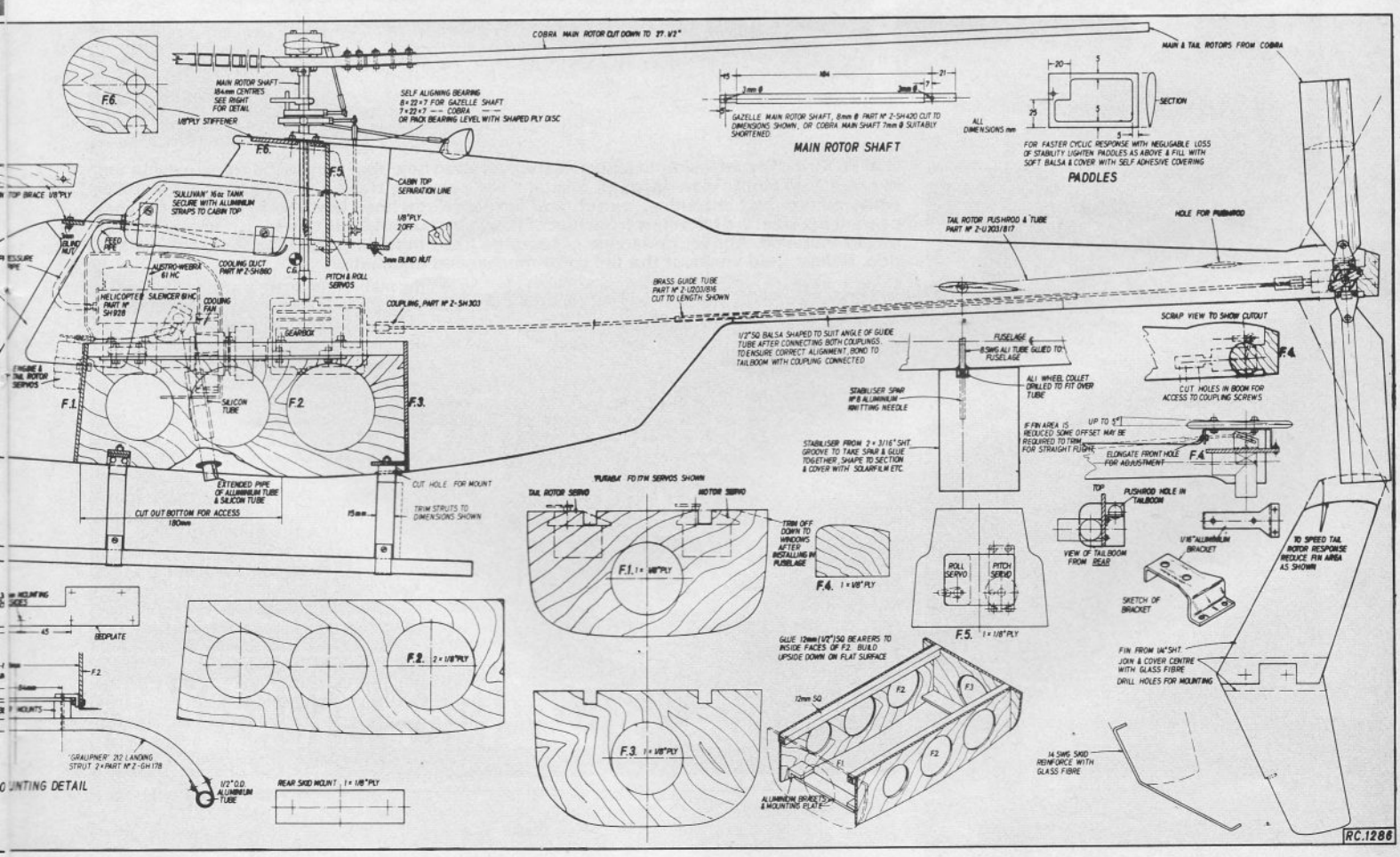
Cut the holes leaving plenty of clearance and fit the rubber mounts. Fabricate the front skid mount as shown. I use the Graupner skid struts as they are strong and light but any other skids will do. When the skids are assembled, fit them to the fuselage as it makes life easier to work on the model.

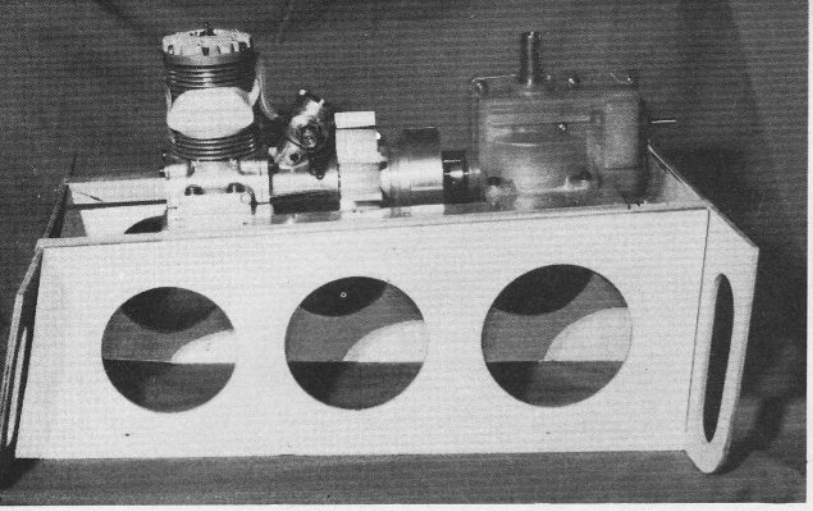
Tail rotor

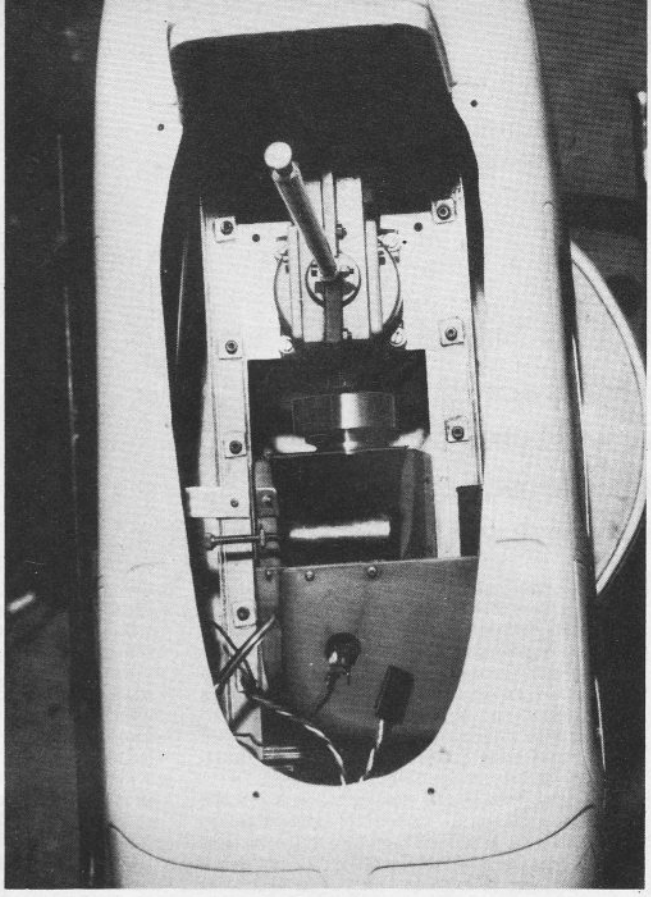
To aid alignment of F4 and the tail rotor drive shaft, fit the engine transmission assembly and main rotor shaft. Cut out the right hand side at the rear of the tail boom and cut a hole in the left side for the tail rotor gearbox. Sand F4 to a good fit and bond in place. Be sure to keep it square to the fuselage centre line and vertical. To provide sufficient clearance between the fin mounting bracket and the pitch change rod, F4 should be fitted as far to the left as possible, leaving just enough space for the gearbox to fit. Epoxy the brass guide tube to a length of ½ in. sq. balsa, slide the tail rotor drive shaft and guide tube down into the tail boom and couple to the gearbox.

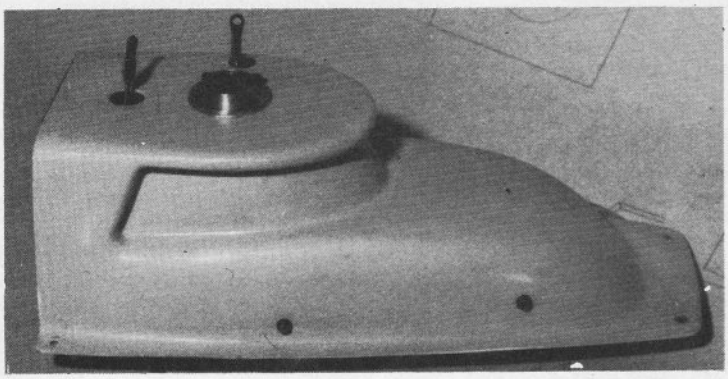
Fit the rear coupling, for which three holes will have to be drilled in the bottom of the tail boom for access to the coupling screws. Push the tail rotor gearbox into the rear coupling and sight through the back of the boom. The tail rotor gearbox should be positioned so that the drive shaft runs straight to the front of the boom. It will probably be necessary to trim the ½ in sq. balsa to achieve this, keep the gearbox as low as possible so that the pitch change arm does not foul the top of the tail boom.

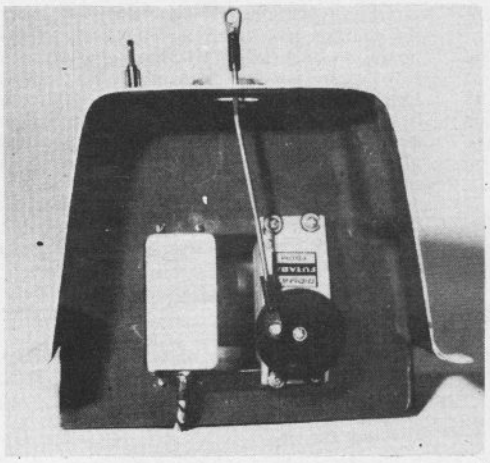
When everything is lined up properly, mount the gearbox to F4 and tack the guide tube in position whilst still connected. Remove the tail rotor gear box and transmission assembly. Drill tail boom for stabiliser bearing tube and bond both the driveshaft guide tube and the stabiliser bearing tube in at the same time using glass tape and resin. Use the resin sparingly and don't allow any to run into the guide tube. A brush attached to an old aerial is the best tool for this rather fiddly job. Cut a hole in the tail boom for the pitch change pushrod and glue into place.

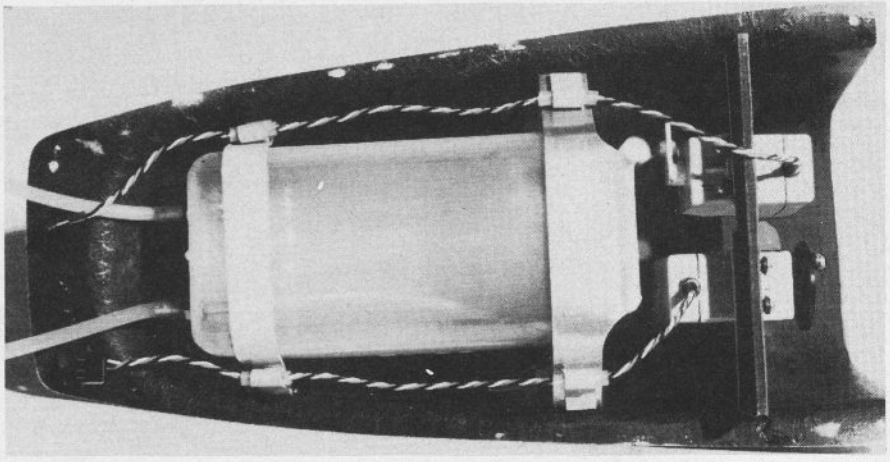




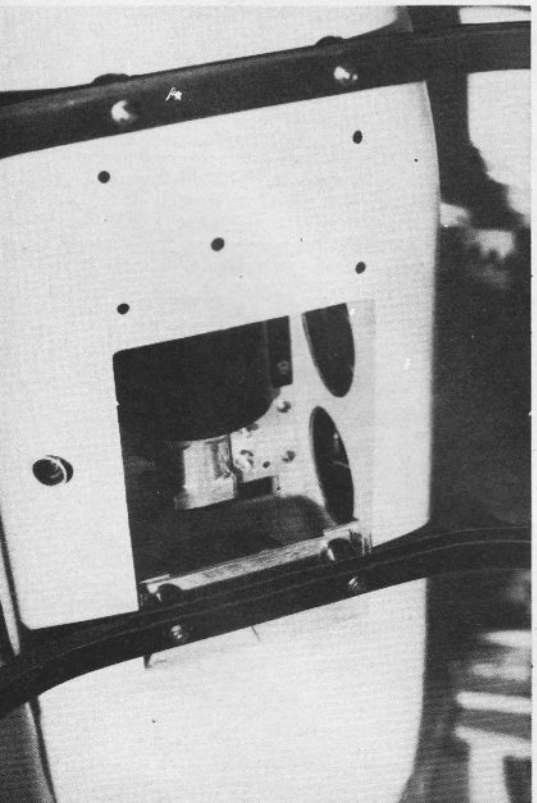


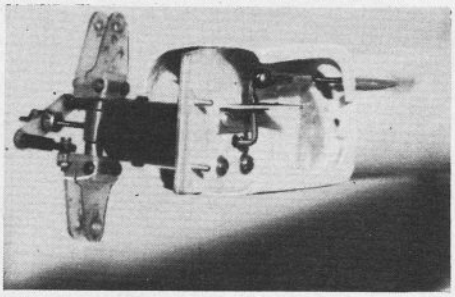


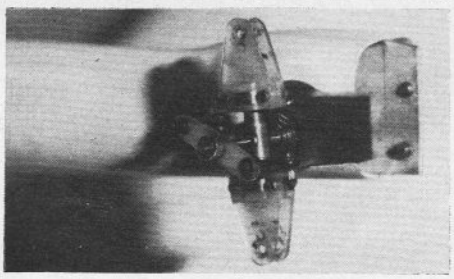




THE WORKS. Top left: simple plywood transmission box with motor and transmission unit in place. Top right: view through fuselage top showing transmission assembly installed with cooling duct shrouding motor. 2nd left: fuselage head cover with main rotor shaft bearing in place. 3rd left: view from rear of fuselage top moulding showing main rotor cyclic servos installed. Above: underside of fuselage head moulding showing fuel tank installation. Below: two views of the tail rotor mechanism installation







As the main rotor shaft is angled forwards, a suitable packing piece will be required for the top bearing. A much better method is to fit a self aligning bearing, this will ensure that there is no loss of power, or vibration due to the misalignment. For a Cobra Shaft (7 mm dia.) fit 7 × 22 × 7 mm Fag bearing No. 127. For Gazelle and DS 22 (8 mm dia.) fit 8 × 22 × 7 mm FAG No. 108. The swashplate will have to be raised about 5 mm if a self aligning bearing is used, to provide sufficient clearance on full cyclic. Shorten the rotor shaft to the dimensions shown. The standard rigid rotor head is used, with the paddles lightened. The main rotor blades are shortened to 27½ in. root to tip and standard Cobra tail rotor blades are fitted.

The fuel tank is mounted in the cabin top with aluminium straps and is pressurised from the silencer. In order to keep the interior of the model clean and to direct the cooling air out of the fuselage a Gazelle cooling duct is fitted to the fan housing. Cut a hole in the duct for access to the glowplug and connect a wire from the glowplug and one from the bedplate to a suitable jack plug in the side of the fuselage.

Make up the horizontal stabiliser, fin and mounting bracket.

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Radio Installation

This is straightforward. The cyclic servos are mounted on F5, one either side and connected to the receiver with two extension leads suitably protected against chafing. Make sure that there is clearance between the servos and the rotor shaft. The motor and tail rotor servos are mounted on the front of F1, either in the appropriate mounts, or with aluminium straps and some form of insulation against vibration. If the front screens are not cut out, then provision for mounting these servos to F1 will have to be made prior to fitting the box. Receiver and battery are fitted in the nose, the aerial is anchored and taken out through a grommet. The assembled model should balance with the main rotor shaft slightly forward of the vertical with an empty tank.

Control movement

The tail rotor pitch arm should travel the full length of the slotted pitch plate with full movement and trim.

The swashplate travel both roll and pitch should be approximately 12 mm measured at the ball joint.

Main rotor pitch should be 4°, tail rotor pitch approximately 8°. The standard Schluter pitch gauge can be used.

Flying

It's just a normal stable helicopter with aerobatic potential and a pleasure to fly. Make good use of the ample tail rotor power and you will need less cyclic in the turns. The optimum setting for the horizontal stabiliser is that which will prevent the nose from dropping in high speed turns, but does not cause the model to balloon in a dive.

The fin may need some offset to trim for straight flight and a good left turn. Being light and non-collective, the model does tend to leap up and down a little in very gusty weather, but nevertheless it is still very manageable. Don't use a DS22 flapping head, it won't fly very well especially without the tail boom. The Schluter collective can be fitted in the normal way, the cyclic servos will have to be fitted lower down and a mixing lever fitted on the gearbox. But the object of the exercise is a light simple model and in its present form it is easy to build and maintain and a real pleasure to fly.