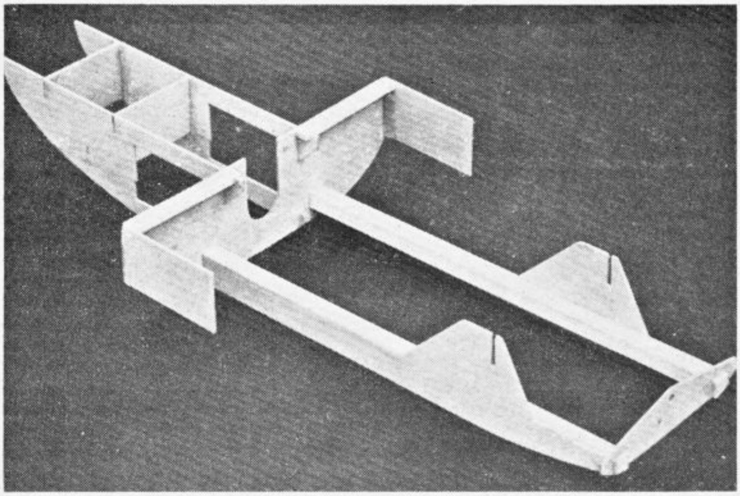
RM TEST REPORT

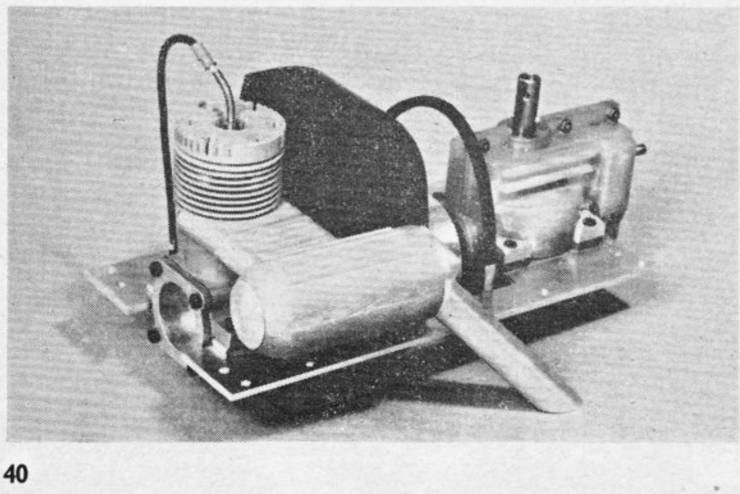
Shuco-Hegi DS-22

from Ripmax

"flies like a dream" says TONY BRAY



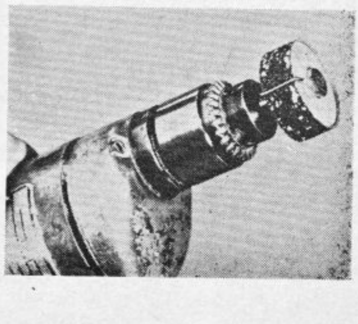
The plywood and spruce sub-frame assembly, which strengthens the fibreglass fuselage, is built separately as seen above. Below: the mechanics assembled onto baseplate, complete with starting ring. Right: sanding disc on drill, used for cleaning up the window cut-outs.

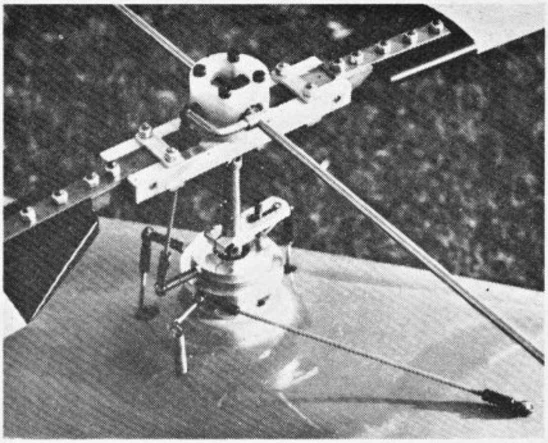


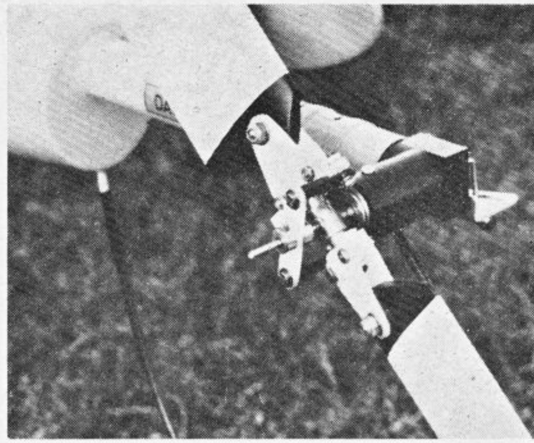
THE LATEST radio-controlled helicopter from pioneer Dieter Schlüter is designated the *D.S.22* and is based on the full-size Enstrom F.28A *Executive*. The kits are imported and distributed in the U.K. by Ripmax Limited.

The kit is complete, with the exception of engine, tank, radio gear and servo-linkages. Any .61 engine may be used, but good slow-running and smooth throttling are essential. If the engine selected does not have an 8 mm. diameter shaft, some mechanical adaptation will be necessary. The Veco 61 is recommended and all the parts necessary to fit this motor are provided in the kit. The H.P.61 may be fitted, but a split sleeve, 7 mm. bore, 8 mm. diameter and 13 mm. long is required to increase the shaft diameter.

The fuselage is a glass-reinforced polyester moulding with a dense white pigmentation and, apart from a little unevenness along the mould lines, the finish is good enough to be left unpainted if desired. The bottom and front openings are already cut, simply requiring trimming, but the windows have to be sawn out and trimmed. This trimming operation can be done very quickly with a power drill and a wooden disc about ½in. thick with a coarse emery paper strip fastened round the edge. All plywood parts are die-cut and the main and tail







Above: the rotor head unit, fitted with "flapping hinge" arms which allow the blades to pivot in vertical plane. Spring from swashplate is described in text. Right: torque rotor fits on end of metal tube tail-boom.

rotor blades are accurately profiled and only require sanding, painting and covering with the plastic film supplied. The mechanical kit is complete to the last washer, and all parts are machined where necessary and only require de-burring and cleaning before assembly.

The front of the fuselage is strengthened with a plywood and spruce assembly, which forms a sub-frame for the engine/gearbox unit and accommodation for the fuel tank. It was not possible to find a suitable 500c.c. tank to fit the space provided in this structure but, by moving one bulkhead forward $\frac{5}{16}$in., a 500cc. Graupner stunt tank may be used.

The tail rotor gearbox is mounted on a thin wall tube which is fitted to the fuselage with two plywood bulkheads. It is worth building the tail rotor gearbox, together with the blades, before fitting this tube so that the clearance between the blades and the fuselage can be checked. The plan shows them passing the side of the fat fibreglass tail, but this gives inadequate clearance. By extending the tube $\frac{3}{16}$in. the blades can pass behind the fibreglass part of the tail and flex without fouling.

The twin fins and tailplane are made from balsa sheet and are probably the most easily damaged part of the airframe. They will be most vulnerable during transit as, although this model is some 13in. shorter than its stablemate, the Bell Huey *Cobra*, it is still large and quite difficult to stow in a small saloon car.

Mechanical differences

The mechanics are similar to those of the *Cobra*, previously reviewed in RADIO MODELLER, with two notable exceptions. The gearbox mouldings have been modified and the bores for the ball bearings now have flanges to locate these bearings axially. Although it is still necessary to glue the bearings into the gearbox and also glue the gearbox halves together, the model is no longer hanging on a bearing which relies on a glue line to keep it in the box. The drain plug has been moved to the bottom of the box so that it is now possible to change the oil without removing the engine/gearbox unit from the fuselage.

The second modification is to the main rotor hub, which is now fitted with flapping hinges. These allow the blades to pivot in a vertical plane and this makes the model more responsive to longitudinal and lateral commands. The coning angle is determined by the resultant of the lift generated by the blade and the centrifugal force acting on it. (*See Fig.* 1.).

In still air, when the swashplate is normal to the rotor shaft, the forces on both blades will be equal and alpha will be the same for each blade. When the swashplate is tilted, the blades will hinge up at the point of maximum lift and down at the point of minimum lift, thus effectively tilting the rotor disc without changing the attitude of the main shaft and thus the fuselage. If the swashplate is quickly returned to neutral, the rotor disc will have tilted and returned to the horizontal without tilting the fuselage. If, however, the swashplate is made to remain tilted, as in forward flight, then the couple acting on the hub will tilt the nose of the fuselage down. (*See Fig.* 2).

This is an over simplification of the forces acting on the blades and the hub, but will illustrate why a model fitted with flapping hinges is more responsive—especially in a hover—than one fitted with a rigid rotor where the fuselage has to tilt with the rotor disc.

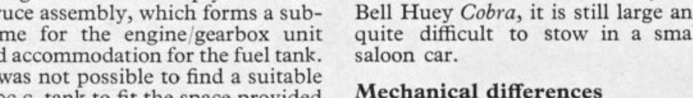
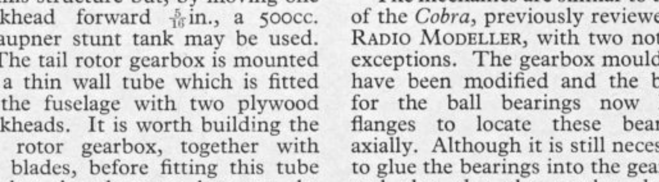


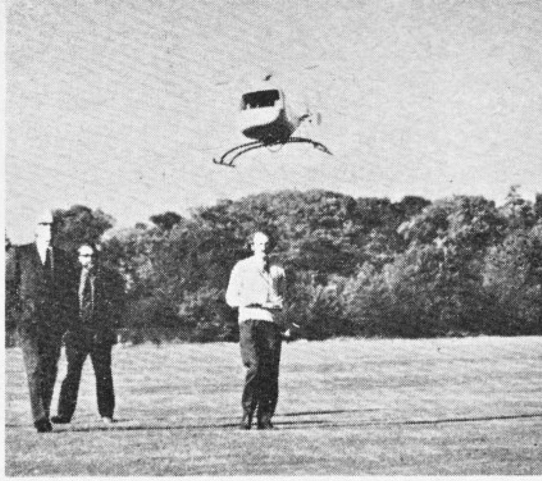
Fig. 1

Fig. 2



Easy hovering

A spring was fitted to the swashplate opposite the lateral control rod. This "loads" the swashplate bearings and lateral servo and was suggested by Dieter Schlüter to make hovering in still air easier. In



Left: " droop " of flapping-hinge blades apparent here. Above: first flight—watched by lunch-hour business executives !

fact, carefully trimmed, the model will hover " hands off " for several seconds at a time.

Flight tests

The initial flight trials illustrated the importance of smooth throttling. Before the motor freed off it needed to be run excessively rich to prevent over-heating and this resulted in the transition from four-stroking to two-stroking occurring in the rpm range used when hovering.

As the throttle was opened, the model would lift off, four-stroking, to the limit of the ground effect. Slight increase in throttle made the motor two-stroke with a rapid increase in power. The increase in shaft torque made the model yaw to the left and rise rapidly. Slight decrease in throttle and the motor four-stroked, lost power, and the model yawed right and descended too rapidly. As the motor freed-off, however, it could be leaned out and the transition to two-stroking occurred before lift-off, making steady hovers possible.

The two photos below show the large amount of room there is in the DS-22's cabin area. The " works " are mostly kept out of sight, at rear of seats, while two servos fit each side of fuel tank.

Summary

This model with its well proven, simple rotor head and robust trouble-free transmission is a pleasure to build. The cavernous fuselage with its huge front opening makes maintenance and cleaning very easy. It is marginally easier to control than the Bell Huey *Cobra* and, being smaller, easier to transport. I can confidently recommend it to the beginner to radio-controlled helicopter flying and to the experienced flyer who yearns for a new model.