RM TEST REPORT the Schlüter BELL 222

". . . the best helicopter yet from Dieter Schluter . . . this model has considerable scope for experiment" says TONY BRAY of this imported kit from Ripmax

THE LATEST helicopter from the Schlüter factory has been developed from the *Super Helibaby*, stretched to use a 10cc motor and incorporating many new sophisticated ideas. The model is supplied as a basic mechanical kit with separate kits for two alternative body arrangements. The simplest of these contains material for a non-scale 'bubble - and - boom' configuration and the more elaborate contains materials to build a near-scale model of the Bell 222.

The kit . . .

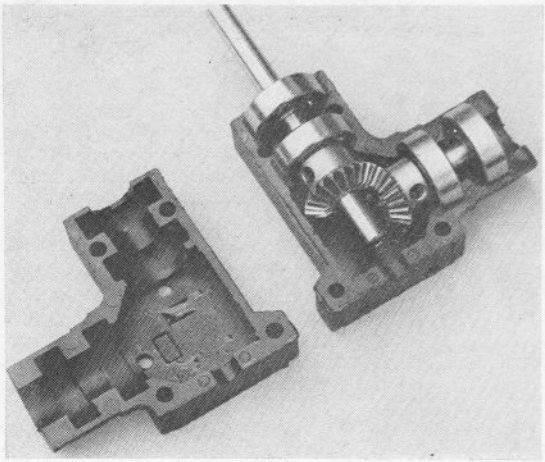
The mechanical kit contains all parts and hardware to complete the basic model. No plan is provided but a very complete instruction book gives step-by-step building details and the parts required for each step are packed in separate numbered bags. An illustration showing every part in the kit with its reference number makes identification easy. A set of socket screw keys and three tube spanners are supplied and these, together with the usual modelling tools, are all that are required to complete the model.

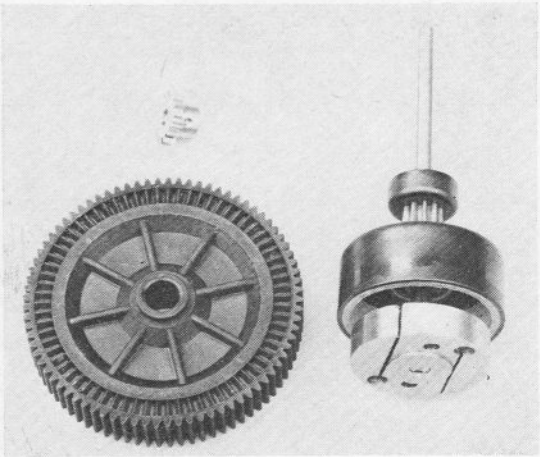
The 'chassis' of this machine comprises two side frames, punched from 2.5mm aluminium alloy sheet, separated by channel section spacers and a 20mm diameter tube for the tail boom. The motor is mounted with the crankshaft vertical and the cylinder head facing forward. The drive is by the standard Schlüter clutch, but the disc is now fitted with a shaft which passes through the clutch bell to just below the main rotor and terminates with an aluminium cone to suit an electric starter.

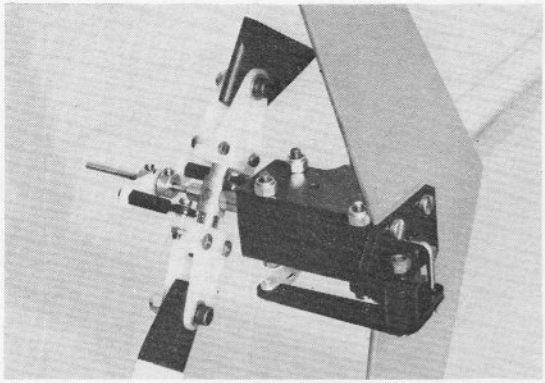
The vee-groove is still machined in the fan for a starting belt but this cannot be used when the scale body is fitted. The drive to the main motor is by single spur reduction with a ratio of 8:1 and the drive to the tail rotor is by a 2mm diameter shaft running inside the tail boom. This shaft is driven by a narrow spur gear which engages with teeth on the upper face of the large gear on the main rotor shaft. The right-angle drive in the tail rotor gearbox is provided by unequal diameter bevel wheels and the overall ratio between the tail rotor and the main rotor is approximately 3.6:1.

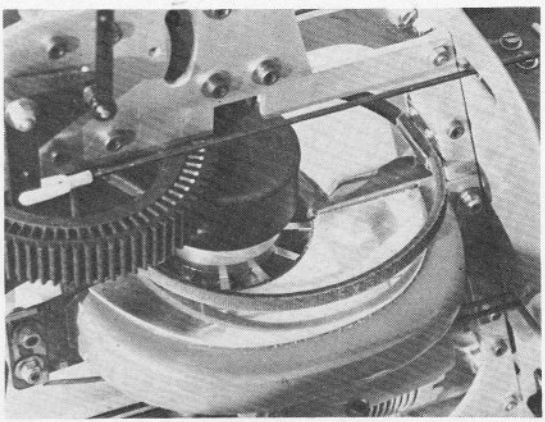
The main rotor head is of a novel design which allows alternative cyclic pitch change arrangements; either pure Hiller or Hiller plus a degree of direct coupling for more positive steering control. Parts are supplied for both arrangements and the change is easily made. Collective pitch is controlled by a bellcrank mounted below the main rotor shaft which moves a 2mm diameter wire, running in a slot in the main shaft. The head uses *Helibaby* style side frames and stub shafts for the blade

Split tail-rotor gear box is easy to assemble and gives simple but positive location of ball-races and gears. *Right:* main rotor reduction gears, clutch plate and drum, showing extension shaft for alternative starting arrangement.









Tail-rotor gearbox with compact pitch change set-up using bellcrank. *Right:* cooling duct with non-standard metal plate to prevent scuffing. Note clip to retain belt.

pitch change. It also uses blade holders similar to the *Helibaby* but these are considerably stiffer than previously, now being made from 1.5mm sheet steel.

The model requires four channel radio and has the collective pitch control and the throttle operated from a single servo. The design of the coupling linkage gives considerable scope for changing the relationship between pitch change and throttle opening. Provision is also made for increasing the tail rotor pitch with increased throttle. This, too, has considerable range of adjustment.

Putting it together

The building of the basic kit is primarily mechanical assembly. Parts need to be de-burred and cleaned but no drilling or other mechanical work is required. The rotating parts require most careful assembly and, if a dial indicator is available, it is desirable to 'clock' each part as it is assembled. The fan is bored 0.25in. diameter and does not lock on a split tapered bush used in previous 10cc powered Schlüter models. If the 0.25in. diameter part of the crankshaft is not ground, it is essential that the fan is 'clocked' to ensure its true running. I found that it was also advisable to check the straightness of the main rotor shaft, either by 'clocking' or rolling it on a sheet of glass, as the one in our sample kit was slightly bent (I suspect this was due to stress relief when the slot was milled).

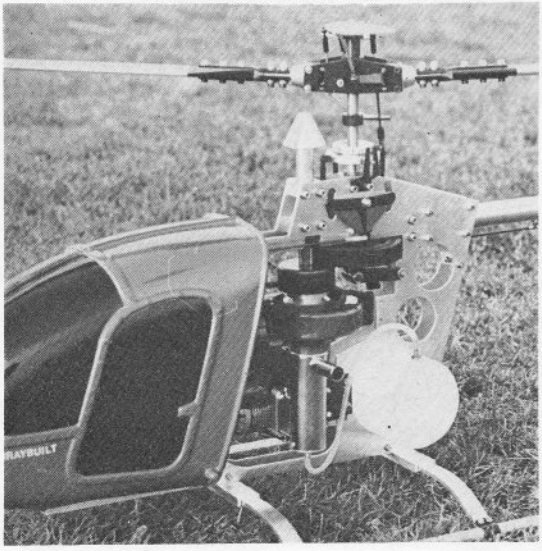
The servo carrier and cabin bulkhead is made from 2mm ply. This is marked but not die-cut. I made a 'mock-up' of the lower horizontal sheet, which carries the throttle and tail rotor servos, before gluing, so as to ensure that the push-rods cleared all obstructions. The needle valve assembly was the main difficulty. I also found it important that this box was not wider than 120mm at the front, as it would have otherwise fouled the plastic canopy.

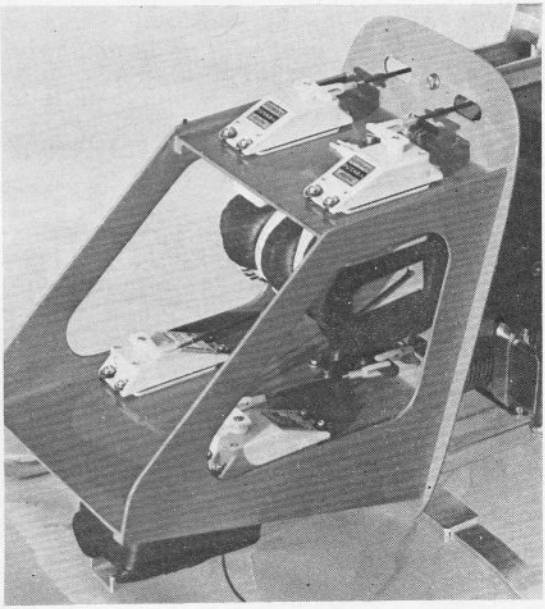
There is ample room for any modern radio gear and, using the Futaba 'M' series, I found that three black and one red servo were required for 'forward to open' throttle configuration.

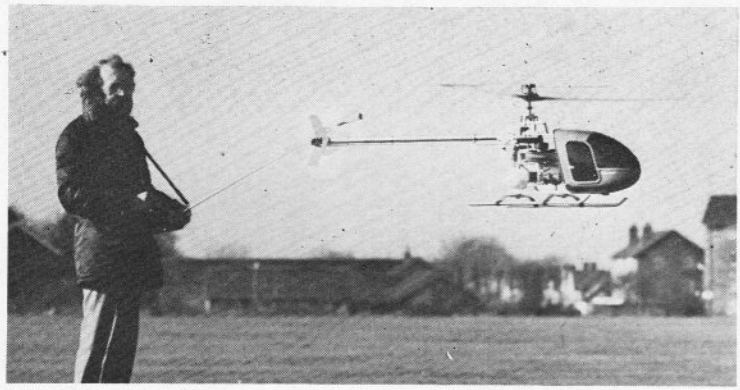
The mouldings supplied for the fan duct and canopy would not cut with shears without cracking so it was necessary to saw them. The roof of the canopy was found to be rather thin and flimsy, and so I reinforced it with a glass-cloth patch 100mm square, fixed with cyanoacrylate.

The rotor blades are pre-formed and only needed the ends finishing and covering. The main rotors were

At right is seen the plywood servo box which has ample room for servo and receiver. The nicad is mounted on aluminium channel to reduce load on the box in the event of a heavy landing.







balanced 'end-for-end' (as described in the *Radio Modeller* dated July 1976) and then assembled on the head with the pitch control rods disconnected. The lead and lag of each blade was adjusted until it balanced about the stub shaft axis. To make this operation as critical as possible I washed all lubrication from the stub shaft bearings. This method of balancing assumes that the stub shafts are on a common centre-line in the plan view and, in the case of the review model, this was certainly so, as it proved completely free of any rotor-head vibration.

Flying

The model was test flown with the main rotor built in the pure Hiller configuration, and using the standard paddles. The main rotor pitch/throttle relationship was adjusted to be as near that recommended in the instructions as possible. The model flew well at this setting but hovered at a rather high throttle opening. I therefore readjusted the setting to increase the pitch at mid throttle without increasing it at the top end. This gives less negative pitch at idle, but this does not seem to be important.

The relationship of pitch to throttle will, of course, depend on the torque curve of the motor and the personal preference of each individual flyer. However, considerable adjustment is available and the relationship is variable over a sufficiently wide range. The tail rotor compensator had been adjusted to give 10° increase in pitch from idle to full throttle and I found this to be almost perfect. With the model in the 'hover', the throttle could be opened fully with only a slight yaw correction to compensate for the increase in torque.

Set up in this way, the '222' was easy to fly and gave an accuracy of control I had not previously experienced. This model has considerable scope for experiment, however, and I intend to increase its response to cyclic pitch change by progressively reducing the weight of the paddles, and then repeating the experiment with the alternative head configuration. This will give direct comparison of two methods of improving response.

Dieter Schlüter and Mike Bosch have already shown that, when fitted with a tuned motor and reinforced rotor blades and rigged to give maximum possible sensitivity of control, this model has a truly aerobatic performance.

Without doubt, the best helicopter yet from Dieter Schlüter.

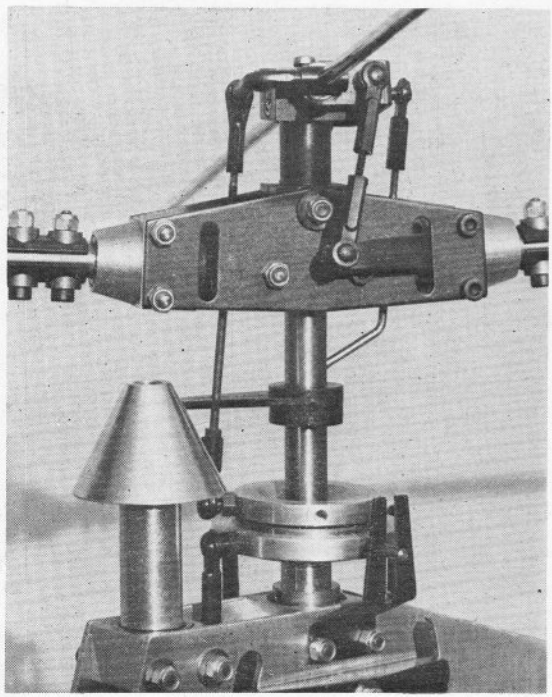
Manufacturer: Ing. Dieter Schlüter, Abbildungen, West Germany.

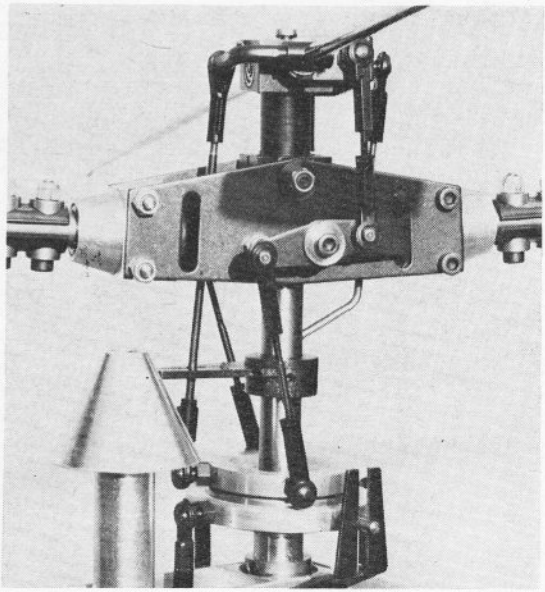
Distributor: Ripmax Models, Ripmax Corner, Green Street, Enfield, Middlesex.

BRCHA——

The British Radio Control Helicopter Association aim to further the development of the r/c helicopter and provide a means of communication between enthusiasts. It is not intended that the Association should become a vehicle for the more contest-oriented flyers, but fly-ins of a less formal nature will be held, with training sessions to encourage participation by all.

Membership details and application forms are available from the Membership Secretary, Nigel Brackley, 57 Hillingdon Hill, Uxbridge, Middx.





These shots show alternative cyclic-pitch control arrangements. On the left is the pure Hiller layout, and on the right we have the additional levers and links to give a degree of direct coupling. The cone is for spinning the motor with conventional electric starter. *Above:* Tony hovers the model, fitted with the non-scale body. (The scale "222" body is also available, as a separate item, as is a wheeled u/c kit—and a float kit).