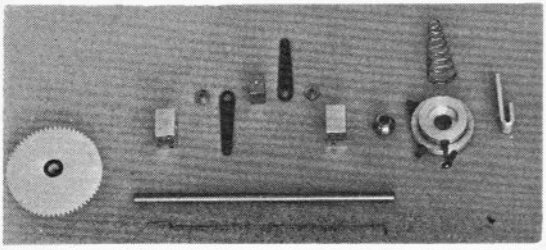
'Copter Corner

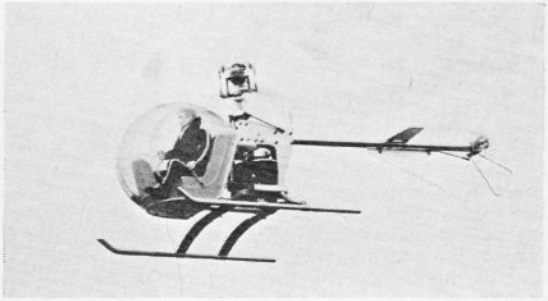
This month TONY BRAY describes the 'Super Heli-Baby' with its collective pitch rotor-head — subject of our cover picture

THE LATEST helicopter development from Dieter Schluter is a collective pitch head for the *Heli-Baby*. This is available either as a conversion for the fixed pitch model or in a kit for a complete model, called the *Super Heli-Baby*.

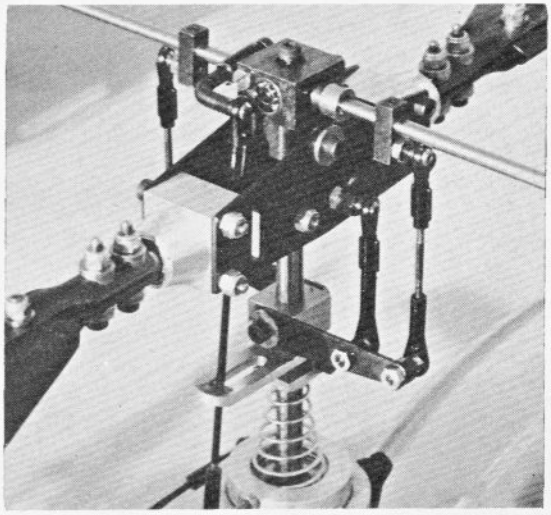
I was pleased to build a *Super Heli-Baby* as, although my original model (built and reviewed in R.M. of October 1975) is still serviceable, it was interesting to examine the "76 Series" improvements. Schluter has made only two major changes to the basic model. These are to the tail rotor shaft bearings and the bearing in the clutch. Previously these were needle rollers running on soft shafts. The tail rotor shaft now runs on double shielded ball bearings, which will end the problem of shaft wear and eliminate the possibility of the bearing lubricant finding its way on to the drive belt. A larger diameter needle roller bearing is now fitted into the clutch disc, and a hardened sleeve is pressed on to the soft shaft. This model is now so sound mechanically that, barring crashes, it must be almost everlasting.

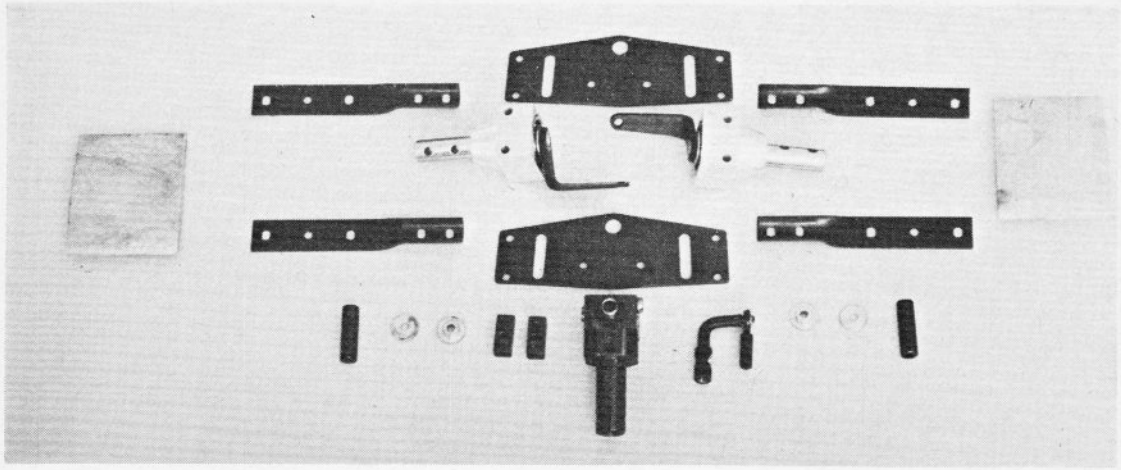
The head is a nicely engineered all-metal unit, with unrestrained teetering of the main rotor blades. The flybar is mounted on a gimbal similar to the *Heli-Baby* but with the main rotor blade hub pivoted below on separate bearings. The blades are mounted on short steel stub shafts, each carried on one needle roller and one ball-bearing taking the combined journal and thrust-loads. The movement of the flybar is transmitted to the main rotor blades through two horizontal mixing levers which are mounted on a brass block free to slide on the main rotor shaft. It is keyed, so that it rotates with this shaft





Heading shows your columnist explaining the advantages of collective pitch to a couple of mere fixed-wing merchants! Above: "Hovering accurately is made much easier." Below, left: swash plate, mixing levers, rotor shaft and large gear.





and moved axially to provide the collective pitch change, by a wire running in a slot milled in the shaft. This wire passes through the swashplate bearing, the shaft bearing and the large gear, to the lower end of the shaft, where it is cranked so that it is on the centre line. This lower end of the wire is clamped in a block mounted in a ball-bearing at one end of a bellcrank pivoted on the main frames. Slots for these pivots are provided in the "76 Series" *Heli-Baby* but have to be cut in earlier models. The other end of this bellcrank is connected to the throttle servo.

No difficulty was experienced in assembling the components and the building instructions are more than adequate. However, if a starting belt is fitted clips should be made to keep it away from the upper end of the bellcrank as it could become trapped and prevent the throttle closing. The collective head is longer than its fixed pitch counterpart, and this increases the main rotor diameter by 40mm. if standard length blades are used. This increase in diameter brings the blade tips rather close to the tail rotor blades so I reduced each main rotor blade by 20mm. A Webra Speed .40 H.C. was used in this model and I found that the power that this motor develops, combined with the slightly smaller motor diameter, made it possible to increase the pitch at full throttle to $3\frac{1}{2}°$, rather than the 2° recommended, without the motor "sagging" or overheating. I also found that the response to cyclic pitch commanded was very much improved by fitting larger and lighter paddles as described in Copter Corner of February 1976.

This head is considerably more complicated than the fixed-pitch version, and incorporates ten ball-joints in its construction. If these joints are not free, they provide considerable damping to the cyclic pitch control. I found it necessary to polish the balls with fine Crocus emery paper to obtain the required free movement.

I have found this head to be completely trouble-free in use. It would, of course, be much more difficult to repair if damaged than the fixed-pitch type, but the improved vertical control it gives makes accurate hovering far easier, and considerably improves the flying performance of this excellent small helicopter.

Above: main rotor hub components, and paddles (fly-bar not shown). Below: basic frame assembly, with throttle actuating bellcrank in place. In the right-hand photograph we see the engine and flywheel in place (but not yet the silencer assembly) —where the wire described in the text may be seen emerging from the short top arm of the bellcrank.