HELI-PAD

By Jack Barnard

REGULAR READERS of this column will no doubt be awaiting with baited breath the results of last month's mention of forthcoming experiments on inverted flight. Unfortunately, our columnists for that issue, John Griffiths and Nigel Brackley, have not yet finalised their experiments, or perhaps they have run out of helicopters!

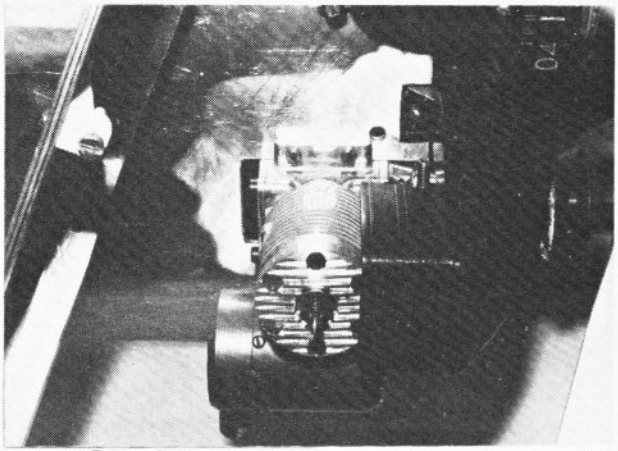
More on Autorotation

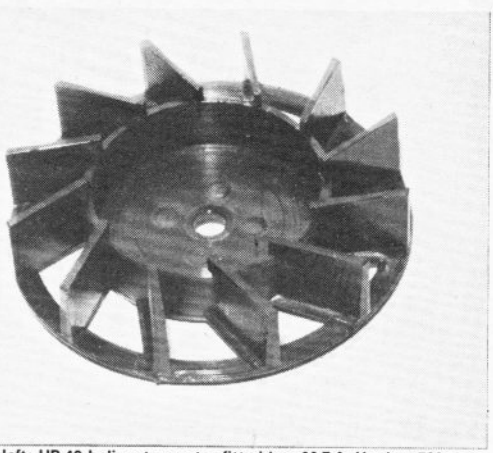
John and Nigel, who, incidentally, are the proprietors of **Slough Radio Control,** did include in their column an excellent article on autorotation and how this is achieved in the latest models. They also included advice on how to practice engine failure.

Most of us suffer a little from nerves when trying out a new manoeuvre and I failed to see how anyone could possibly steel themselves to close the throttle of their very expensive helicopter a hundred feet above the ground to test out this autorotation innovation—I know I couldn't! I decided it would be a lot cheaper on helicopters (and Valium tablets!) to have an expert demonstrate the manoeuvre and talked Dave Nieman (one expert who needs no introduction) into bringing along a couple of his models, fitted with this new safety device, to our local field and show me exactly how it was done.

It works! In fact, the demonstration was so convincing that there and then I decided I would never again try flying a 'copter not fitted with the necessary free-wheeling device.

Right; Dave Nieman 'lifts-off' his Hirobo *Falcon* (fitted with freewheel unit described in last months Heli-Pad) at the start of the very convincing autorotation demonstration described in the text. Dave also gave an excellent demonstration of the exceptional stability of the Falcon which would possibly be the ideal trainer for the beginner. Below; this one is definitely not recommended for the beginner. The scale Aerospatial SA-315B *'Lama'*, fitted with a 20cc petrol engine, is a beautiful piece of machinery. This one is also fitted with a freewheeling rotor head but, unless you happen to be a very rich person, is not the model to try out your first 'engine-out' landing with! A big model — weighs approximately 22½ lbs and its main rotor diameter is approximately 83 inches.





Above left; HP.40 helicopter motor fitted in a M.F.A. Hughes 500, note cooling-air duct. Above; the centrifugal fan which supplies the cooling-air bolts direct to the motor drive shaft. (A Jim Morley design, as are most other parts of this model).

Dave flew one of his new **Hirobo** *Falcon* models around for a while at about a hundred feet up and then suddenly closed the throttle right back. The model descended at about a 40 degree angle, 'flared out' at a couple of feet above the ground and sat gently down. I was so taken by surprise and so intrigued, that, although I had my camera ready to take a shot of what I thought was about to be the 'crash of the month' I failed to get a shot of the successful manoeuvre!

Dave also demonstrated how it is possible to open the throttle to 'lift-off' revs and then, just as the model was about to lift-off, close the throttle and still have enough 'inertia revs' on the freewheeling rotor to lift-off to a foot above the ground.

I've ordered my model with a free-wheeling head!

Beginners Corner

We have received a number of letters asking that we make our beginners corner a little less technical! What the writers really mean of course, is that we explain the various parts in greater detail and in easier to understand terms—we did in fact promise to take a closer look at the mechanics in our February issue of *Beginners Corner.*

The Engine

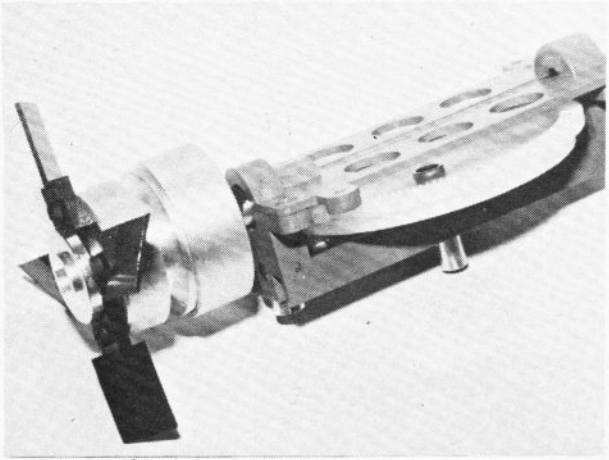
In the early days of the R/C helicopter it was quite common for kits to be advertised as suitable for 'any air cooled motor' within the recommended power range. I remember building one of the early helicopter kits and fitting a 'hot' .19 cu. in. motor which lifted the model quite easily into the air at half throttle while other builders of the same model who had fitted .20's and .25's found they just hadn't enough power to get theirs airborne. My particular motor did, however, have a drawback, it tended to overheat and I found it necessary to fit an extra large 'heat-sink' to the cylinder head. Nowadays most kit manufacturers recommend the make of motor which is most suitable for their models and many engine manufacturers have now produced special helicopter motors.

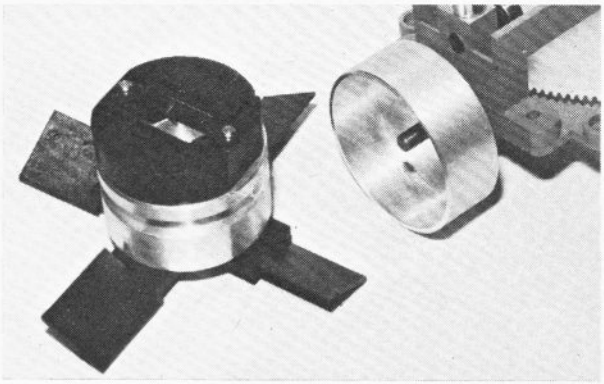
Helicopter kits are expensive and a good motor is a 'must', not only for its general performance but above all, reliability—so get a good one, don't fit that old 'cooking' motor which has been hauling your trainer plane around the sky for a couple of seasons. Adequate cooling of the motor is very important. Training type and general sport models require easily accessible mechanics and on these types it is frequent practice to fit the motor to an open frame where it can be cooled by the airflow from the main rotors, using a large heat-sink around the head and upper cylinder finning. More advanced models are fitted with ducts which direct cooling air from a centrifugal fan, driven by the motor, over the head and cylinder finning.

An air intake filter for the carburettor is a worthwhile investment as quite a lot of dust etc. is thrown upward around the engine when the model is close to the ground i.e. taking-off, hovering and landing. While on the subject of filters don't forget to fit at least one full-flow filter in the fuel line from the tank to the carburettor—another at the air inlet to the fuel tank will keep out unwanted particles of dust etc.

Clutch

We recently received a letter from a reader asking our opinion as to why his model would not 'lift-off'. He had fitted the recommended motor, set the rotor blades at the correct angle etc. In fact, he had checked and rechecked every part, except apparently, the





Left; clutch unit and reduction gearing of the Graupner Bell 47. Above; clutch unit dismantled to show clutch shoe 'bob-weights' fitted with 'leaf' springs.

centrifugal clutch, which he did not mention.

The clutch is a very essential unit as it allows the engine to be started, at low r.p.m. without the rotors turning. Without it, chopper pilots would be easily recognisable by their badly scarred faces, as were swordsmen duelists of bygone days! The helicopter centrifugal clutch is positioned between the motor and main drive shaft. It normally includes, as a unit, the flywheel, starting pulley and in many cases, the engine cooling fan.

It is essential, when assembling the unit, to fully understand its operation. Clutch designs vary, but most use the same principle i.e. spring loaded 'Bob Weight' plates which move outward, as engine revs are increased, to come into contact with the clutch drum. The 'Bob Weights' are attached to the engine shaft and the drum to the rotor gear-box drive shaft.

As I have already mentioned, designs vary; some manufacturers use metal 'Bob Weights' and a cork, leather or other suitable material fixed as a lining to the inside of the clutch drum. Other manufacturers use a clutch shoe material for the 'Bob Weights' and plain metal contact face on the drums.

Clutch Slip

It is possible to wrongly assemble some units and end up with insufficient contact area between the shoes and the drum. Other faults which lead to clutch slip are badly fitted linings and wrongly tensioned shoe return springs. Clutch slip is not easy to diagnose, especially by the beginner. The clutch may appear to be in perfect working order, you start your motor and as you increase the engine revs the rotors start to turn as they should, apparently increasing in speed as they should. When, however, the rotors reach 'high drag' revolutions, your wrongly assembled clutch may slip. The motor may be producing its full power, but this is not being transferred to the rotors. So, if your 'copter is reluctant to leave terra firma at full power—check that clutch, 10 to 1 it is slipping.