

ELI-PAD

by John Heaton

I HAVE over the winter developed what I believe to be the biggest breakthrough in model helicopter design since autorotation devices. As the photos show, I have, by dint of painstaking hours of experimentation got a flybarless head working so well that it actually performs better than with a flybar. I know the system has been used before but the ones I have seen and tried all seem to have the same undesirable characteristics in common.

Having, I considered, perfected the rotor I built up a scratch *Jet Ranger*, incorporating all the ideas I think desirable. This month I give you an insight to some of my thinking.

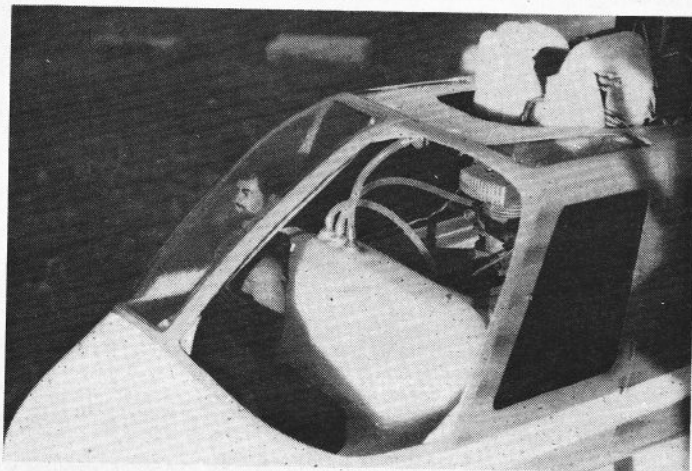
I decided on a *Ranger* because I think it is a pretty subject and also because there is a full size one right next door to me at **Somerton Rayner Helicopters**, this specific example, **G-BAZN**, being the one I modelled.

The first thing I had to decide upon was the type of transmission I would use, the choices open to me being the **Kavan** system, nylon cog type or oil filled gear box. It was eventually a toss up between the nylon cog or the oil filled gear box. The nylon cog system is very suitable for a *Ranger* because the tail drive comes out in a perfect line to the boom but, in the end the oil filled gear box was favoured because I didn't fancy starting through a side window on a scale job.

Having decided on the type of transmission I laid out all the chosen mechanics and then started to cut and mount some of the woodwork inside the fuselage. At an early stage I had decided to mix as many mechanics from different types as possible. A, as an exercise, B, to try to combine the best of all worlds. I ended up with **Kalt** gearbox, clutch and tail rotor and a **Hirobo** based head, with my own design blades and control system for the so called (erroneously) rigid rotor.

The main basic design feature of this model is the placement of the transmission high up in the fuselage, this provides three major advantages. (1). The tail drive goes in a straight line, which obviates either having a double bend for the piano wire or utilising a speedo drive type flexible cable. Not that I haven't used both systems without a hint of bother but my personal preference is to simplicate if possible. (2). I can fully enclose a tuned pipe. (3). I can fit a huge fuel tank below the carburettor so there is absolutely no chance of the engine flooding whilst standing with fuel in the tank. I expect that many of you know how infuriating this can be.

Below: close-up of John's *Jet Ranger* cockpit shows engine, fuel tank and 'pilot.' The motor, OS45, looks rather small but does in fact provide adequate power for this 11lb model.



Above: John is very pleased with his latest 'creation' (modelled on a full size *Jet Ranger*) which is fitted with his own design 'flybarless' rotor head. This model utilises various parts taken from a selection of model helicopters to 'combine the best of all worlds.'

Having had excellent results with the *Cobra* (reported last month) fitted with an O.S. 45 I decided to see just how much this motor would lift and fitted one to the *Ranger* which is a full fat 60 size model as opposed to the *Cobra* being a skinny 60 size model, if you see what I mean.

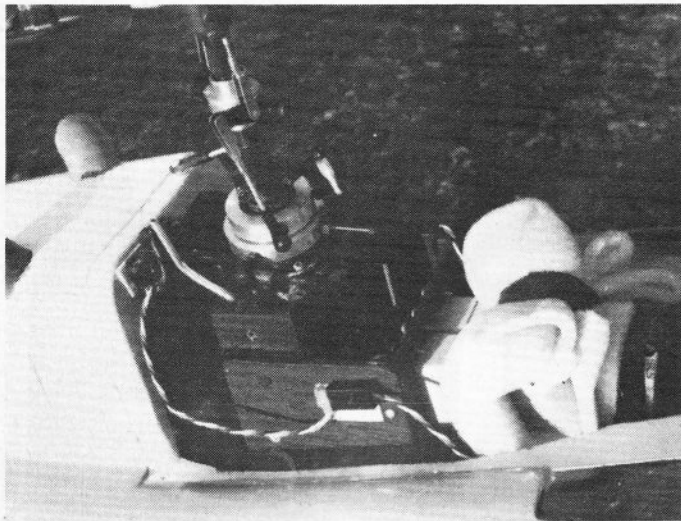
Another quandary was whether to control the blades collectively by moving the swashplate, or by having a link up the side of the shaft. Although I feel the moving swashplate is a better system, I used the alternative because it makes the internal linkage much simpler, and, having raised the transmission I didn't have a lot of room. As can be seen from the photos you have to pay for the simple linkage with mixing levers but it is down again to the old swings and roundabouts. Basically though, once you have decided on how much you want to alter the pitch of the main blades cyclically and collectively, how you arrange the linkage doesn't really make any difference as long as it is slop free and reliable.

And so to the acid test — the engine fired up easily (having preset the carburettor the same as the *Cobra* of last months feature). Well, she just lifted off at nice steady revs and flew a treat. I have subsequently fine-tuned the mixture and pitch etc. but no mods required at all and surprise-surprise plenty of power from the O.S. 45 lifting over 11 lbs with full fuel, mind you, I have found that by doing away with the flybar you definitely reduce the power requirement. So there we have the background to my latest model; doesn't she look pretty, all ready for another sortie. The engine is very quiet, lots of power from the enclosed tuned pipe and no out of scale flybar to spoil the show!

I have received a welcome letter from Mr Namih who writes:

"I read your article on setting up the *Lama* in the February issue of *Radio Modeller* with great interest.

I am in agreement with you regarding the relations of the collective pitch and throttle set up. Many modellers build up the r.p.m. before introducing the collective pitch which produces a very jumpy flight. This, I believe, was based on earlier instructions from German helicopters. I am surprised to learn that you did not use the separate servos for collective pitch and throttle. As you know, the use of 2 servos simplifies the setting up of collective pitch, since, if used in conjunction with a helicopter type radio, would give instant adjustment at the transmitter. For example, you can alter the collective pitch angle range with the throttle trim on the **Sanwa**



Above: close-up shot of the *Jet Ranger* swash-plate and control rods to the rotor head. Above right: the enclosed tuned pipe can be seen in this airbourne shot. Below: two more flying shots of the *Jet Ranger*.



Black Custom helicopter radio if 2 servos are used. The rate of increase of collective pitch can be adjusted to match the engine power on the **Futaba J** series helicopter version. Moreover, there is an added safety factor in using 2 servos. If one servo packs up there will still be some degree of control. The collective pitch servo is under heavy load and especially in the windy conditions that prevail in this country. The motor on the collective pitch servos of one of my *Iroquios*' went faulty during an exhibition flight in the **Barclaycard Show** in Coventry last summer and I continued to fly the helicopter as a fixed pitch machine with throttle servo operating only.

Mixing between throttle and tail rotor is also very useful for a beginner as it is very difficult for him to control the tail, let alone hold enough stick movement to achieve hover or forward flights. For example, I know someone who has just started with helicopters and when the *Falcon* was properly trimmed and set up he was able to take it in the hover immediately without having to do any adjustments. This gave the modeller a sense of achievement and he was then able to hover and do forward flights in a very short period of time.

Another feature which I found to be very helpful to beginners is the latest gyros by **Futaba** and **Sanwa**. A newcomer to the hobby recently could only hover his helicopter after fitting a gyro. This

allowed him to improve rapidly.

Mixing radios and gyros are major aids to beginners. They make model helicopters more popular and feasible and should be recommended to encourage more people into this aspect of modelling. I hope you will include something about them in your future articles.

I recently finished building a *Lama 50* as I was inspired by your reviews on this particular model. One or two modifications were included that could be of interest to our readers. The new *Hirobo* silencer was fitted vertically instead of horizontally using an O.S. 90° exhaust adaptor. This eliminated the need of cutting the cabin or removing pieces from the chassis. Part of the engine cooling cowl was used as an instrument consul housing the receiver and the battery pack. All servo wires were passed underneath the tank to receiver. I will forward you photographs as soon as I receive them. The tail rotor was placed on the right of the tail boom as in the full scale version. Two front seats made out of brass tube and canvas will be placed above the 4 servos. The gyro is fitted with servo tape under the panel carrying the dummy jet engine.

Many helicopter enthusiasts look forward to reading your column in the *Radio Modeller*. My best wishes for your efforts and happy hovering."

Thank you Mr Namih for your letter. Your photos will prove interesting for a future issue. It is fascinating that there are so many routes to follow with rotary wing. Whilst your electronic sophistication is not the one I personally follow, I'm sure many will be interested and if you care to furnish me with an article on the sort of device you mention, I will be pleased to include it in a future issue.

