



by John Heaton

QUITE A FEW interesting models have been seen over the past months and deserve some description.

One of these was a Kalt *Baron 20* which had just about every conceivable feature fitted, starting with a J-series helicopter set, O.S. 28 FSR-H, Futaba gyro with its own battery pack, a Bell-Hiller mixing system and autorotation. Initially the gyro was too sensitive and the tail wagged from side to side. The sensitivity was reduced on the adjustment pots provided and got things nicely under control. Cyclic was very firm yet docile, much more docile than the straight-forward Hiller steering. Control response was as good as you could find on any small model, no lag or delay at all but without being the slightest bit twitchy.

Like all the *Baron 20*'s the tail rotor was extremely powerful. The model was very docile with the gyro switched in but flew untidily, in as much as it tail-wagged a little, but tended to hold to heading when trimmed. For an experienced flyer, the flight path was smoother with the gyro switched off, for it was not fighting the pilot. The novice who subsequently flew the model, however, found it much easier to fly with the gyro as it reduces the workload.

Engine performance was splendid, displaying good starting characteristics, seemingly unlimited power and good manners. The J-series radio control had some very nice features and didn't mind the aerial being routed back and forth inside the canopy. Tail rotor collective mixing is set by switching off the gyro and adjusting a mixer control knob to the optimum position for cancelling the yaw that follows collective pitch changes. With the gyro switched in again the model would hold its heading for

quite a few seconds and could be taken off and landed without touching the rudder stick. Another feature used on the radio control was the collective pitch trim setting, whereby you can alter the relationship between throttle and pitch. This adjustment, however, only provides a slight effect to perfect the comparatively coarse settings determined on the ground.

I did not try any autorotations as the model was brand new and an expensive box of tricks, but I have no doubt that the model will perform well, although I have not actually witnessed a *Baron 20* doing this manoeuvre.

Falcon flier

Another interesting model belongs to John Satterthwaite from Tamworth. Basically a *Falcon 505* with an OS50FSR-H, it is fitted with many extras, like a Futaba gyro, Hirobo SST head with metal paddles, SST swashplate, Schluter silencing system, home brewed tail rotor hinges, ball races on every conceivable control system pivot point and helical main gear set. I was astounded by this model, it was so easy to fly I thought it was automatic, very stable but with nice response. The engine rpm was very high but the model was quiet due to the comprehensive silencing system. Extremely smooth flying and with no sign of rotor induced vibrations, the *Falcon* was a real delight.

John has flown this model with an OS Wankel rotary engine and relates that the engine was quiet and smooth with plenty of power, but the silencer kept coming loose,

more from getting so hot as opposed to any bad vibrations. He brought the engine along and I fired it up and was enthused by the different sound and smoothness. I am determined to give one of these a go in something.

I was astounded by John's workmanship on the model, with things like tungsten balls on the connectors. When asked how they were drilled, he replied that the holes were spark eroded. Many other fittings were purpose made from stainless steel. John's skill must run in the family, for his fourteen year old son Guy was also flying the model in an equally tidy fashion.

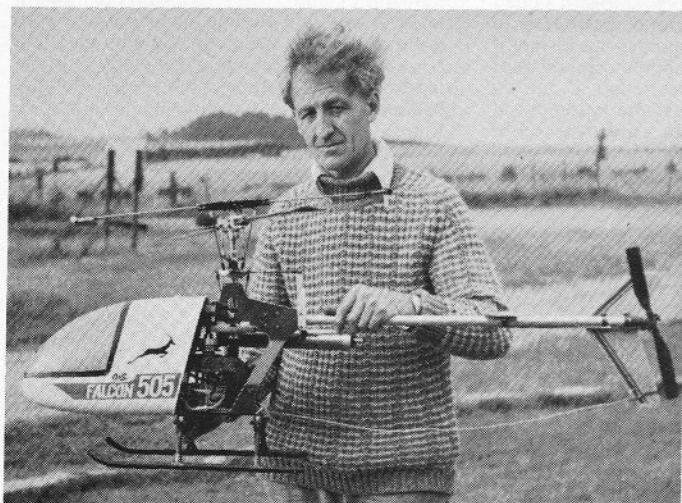
MM Wallis

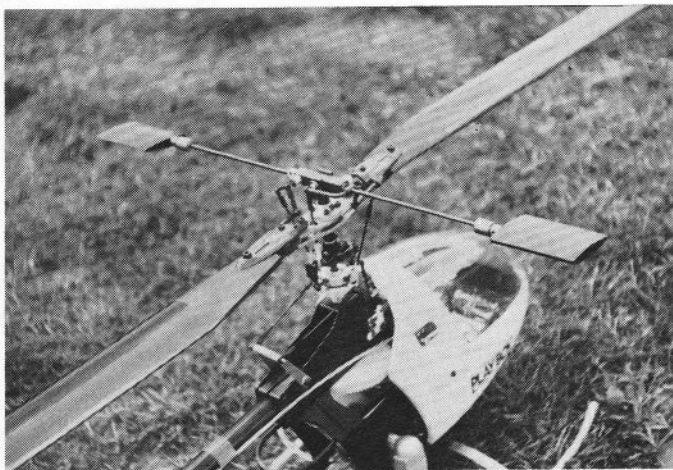
This is an interesting single rotor autogyro based on the fullsize Wallis of 007 'Little Nellie' fame. It is considerably larger than the superficially similar Kalt *Robin*, but there are many different design points. Main rotor cyclic control employs a swashplate controlled flybar system with a teetering rotor. The recommended engine sizes are from .40 to .60 and the model is constructed from various types of materials, dural tube keel, pressed alloy engine plate, vacuum formed fuselage fairings and balsa tail surfaces.

The kit builds up fairly quickly into a very impressive model. Perhaps the most important and interesting feature is the method of spin up. An autogyro rotor is turned by the airflow, not engine power, but to reduce the take off run the rotor is initially spun up by the engine before the aircraft starts to accelerate. There is a toothed belt drive from the engine to a clutch, which drives a crown wheel and pinion fixed to rotor shaft.

This crown wheel incorporates a free-wheel (like an autorotation device) and when

Left: John Satterthwaite with *Falcon 505* (see 'Falcon Flier' for details). Right: the new *Playboy Collective* from MacGregor, photographed with a Kalt *Robin* autogyro.





Left: complex and highly efficient rotor head of the Ishimasa *Playboy* Collective. Right: state-of-the-art Kait *Baron 20* - see text.

the autogiro is flying the airflow keeps the blades spinning faster than the transmission, therefore not imparting torque onto the fuselage. Even with this assistance, the model would have an embarrassingly long take-off run, so it has a system built in which uses a ground secured tether with a servo operated release, so that with full throttle up to 80 per cent or so of the minimum lift rotor rpm may be achieved, release the tether by application of full left rudder, then the final rpm is reached during a ground run of a few yards and the model lifts off in the normal autogiro way.

The take off starts with the model tethered and pointing a little to the right of the wind (the job of left to release the tether will straighten her up) and the model lifts off cleanly after a run of about ten yards.

Several things are quickly noticed. Firstly, the elevator effect is quite limited and it is necessary to reduce throttle to get the nose down while lateral (aileron) control is very docile and stable, likewise yaw control with rudder. Orientation presents quite a few problems, even to one used to helicopters, although the model looks fantastic in the air with exactly the right sit, rotor speed and everything.

Approach and landing can be terrific, throttle being used as the main control of vertical descent, properly executed, the eventual landing can be feather light with a ground roll of about a foot.

Two specific points caused problems, both in the rotor spin-up systems. The clutch used is a rather flimsy and difficult to set up item and could be improved, even if it is only used intermittently. Second item on the list is the tether release. Although this is an ingenious idea linking it to the rudder does cause the model to swing if released with the engine at full power. It might be practical to employ full trim on full throttle to release, or the best option would be an extra servo.

The rotor head turns very smoothly and no rotor-induced vibration was apparent despite very nominal setting up and balancing of the rotor system. It turns at about 600rpm, half that of a normal helicopter, probably making things less critical.

Scale appearance is very good, the vacuum formed pilot in particular being very realistic. This example described had no scale detail at all but was so full of character in flight the imagination is fired to build a super scale version. Picture one with a four stroke flat twin engine, resembling the Franklin twin fitted to some full size versions, cleaned up undercarriage and, something I feel useful for an autogiro, a steerable nosewheel.

Playboy collective

A recent addition to the number of helicopters designed for .25cu.in engines comes from MacGregor Industries in the form of the *Playboy Collective*. The example that was examined by your writer was powered by the ubiquitous OS25FSR and

controlled by the new JR Laser that has servo reversing, the one radio system extra that I find useful. Collective pitch uses the moving swashplate system and is very neatly executed, ending up with a very precise slop-free swashplate.

Servos are fixed to plates with servo mounting tape and tie wraps. The engine mountings are good, machined alloy with threaded holes for fixing, while the clutch is a superb unit, absolutely drag and slip-free, much larger than those found on comparative sized models and made from paxolin type material with leading shoes that should last a lifetime. The main transmission is a nylon cog as usual, although the large plastic gear looks as if it was machined rather than moulded.

There are two exceptionally interesting features on this model. The first is the unusual rotor head, which uses a glass reinforced plastic plate instead of a teeter hinge to allow the blades to move, but the clever bit is a substantial metal plate mounted below the flex beam so the blades can swing up but not down into the boom. Bell-Hiller control mixing is employed together with a so called washout control unit which looks like a Hirobo unit.

Second is the tail drive, which takes the form of a toothed belt running down the tail boom, therefore dispensing with the need for right angle gearboxes. Belt tail drives have been tried before but not too successfully due to slippage, etc., but this is the first time that a toothed belt has been used. It is a well designed set up with steel pulley wheels and a steel reinforced belt, which looks set to last a lifetime. The starting belt is much stiffer than normal and used from the rear, being guided by the side frames, a very handy system.

For the first flight, *Playboy* was set up with roughly flat pitch at low throttle and the links to the blades were adjusted to achieve a desired rotor rpm at full throttle, as described in the instructions. Cyclic controls are very linear thanks to the Bell/Hiller mixing and the tail control is not twitchy at all. In some ways flight performance is similar to a *Helimax* although in my view better suited to the ordinary flier. At some rotor speeds a nodding motion starts up, which can be completely cured by sweeping each main blade forwards about three degrees. All in all the flight performance was extremely good, quite the best .25 sized model I have yet to come across. It is possible on a calm day to trim the model carefully for large circuits then place the transmitter on the ground and the model will happily free flight. Overall efficiency is exceptional, with the large lifting section blades the engine coped effortlessly.

Playboy proved to be totally reliable over a week of intensive flying, as was the novel tail drive. One thing to watch for is that some of

the factory assembled items were loose. One should not assume that because they are factory assembled that they are fully tightened.

Four stroke version

As an experiment I fitted the model with a Saito FA-40 four-stroke. Surprisingly few modifications were necessary, filing out the mounting and drilling a hole in the side of the plate for the exhaust was literally all that was needed.

Flight performance was acceptable but not quite as sharp as with the two stroke. The engine was a bit finicky as regards mixture and it was quite difficult to achieve perfect rpm control at all stick positions but no basic problems. If you want to fly a four stroke go ahead, bolt one in and go flying.

Four stroke powered Iroquois

Derek Payne, who has been flying an immaculate Hirobo *Iroquois* for three years, asked me whether it was worth fitting a four stroke to his model, adding that he had heard that the gearing was unsuitable. I explained that there was no inherent problems having successfully flown two four-stroke powered jobs.

Derek fitted an OS60FS because it went in with little modifications and he did not want to hack his model about too much. He installed it and first flights were tried using straight castor fuel with extra oil for running in. With the aid of a breeze the model flew OK, but was over-pitching at the top end and the motor was running a bit erratic due to the straight fuel. The pitch movement was reduced to prevent too much coming on at the top end and things were much better. Derek was under the impression that there was insufficient power but I stressed that it showed potential, as the model was actually flying on straight castor fuel with extra oil added and a brand new motor.

The next session was conducted with Dynaglo five per cent in the tank and a breeze blowing on a cool but not cold day. The motor ran impeccably on this fuel and showed its true colours. The model flew perfectly, beautiful circuits on half throttle. Needless to say Derek was delighted and looks forward to a winter of four stroke flying.

I do feel that the model would run out of steam on a still summer's day but I believe we have to progress in gradual stages. For example John Griffiths was telling me that he fitted a single cylinder 120 four stroke in a model but could not get it started due to its high compression.

The ultimate power plant for a model helicopter would seem to be a horizontal twin such as the OS Gemini, giving easy starting (moderate compression) smooth running, realistic sound, easy exhaust route, etc. The only problem is that the models would require substantial redesigning as the mounts are totally different and cooling ducts are obviously the wrong shape. Still, one day!