

# HOVERING ABOUT with Jim Morley



I RECEIVE MANY LETTERS which I very much enjoy reading, but just occasionally I get one which stands out from the rest and is reproduced here in case your sense of humour is the same as mine, and secondly because it may convince some of you who have had helicopter problems to keep trying. The letter is from a gentleman who meets up with his son to have flying sessions at a conveniently situated venue midway between their two homes, he writes: "Early in 1976 my son bought this machine (a helicopter) in a somewhat secondhand condition and for a very reasonable price. When he showed it to me my heart sank, he is not in the habit of making wrong decisions, but I really thought he'd wasted his money on this occasion. As you will see, he was absolutely right as usual, but I said nothing, and was not interested, which of course was what he expected at the time. However, he very cunningly left the model in my house and we did not hear from him for a week.

"Curiosity got the better of me, and after a couple of days I just had to go and have a closer look at it. My interest grew. Lots of things needed to be done to it, the fuselage joints were mostly loose as were parts of the frame which had only been glued together. All the grub screws had been overtightened and many new parts had to be made on my Myford lathe. The engine looked as if it had flown in several other aircraft in earlier life and was not too bright.

"In November 1976 we did tethered trials on an adapted mangle stand which allowed

of other things, restoration work commenced commemorated by a notice in the cab stating 'major airframe overhaul 2/77'. This time we paid more attention to rotor balance and reliable electrical connections and pilot training was restarted, but it would not take off. So back to the workshop for weight reduction, shortening of the skids and machining metal off here, there and everywhere, lighter silencer etc. After this it did manage to get up to about three feet for about five seconds or so, but that was all, and the conclusion was that she was underpowered due to the worn engine. We doubt whether the original owner was ever able to get her off the ground for the same reason.

"At about that time, early in 1977, my son acquired another helicopter with a broken back, reputedly rolled by its previous owner. He repaired it, and we have flown it on many occasions, but we have always had a soft spot for the first one. I bought it from my son and was promptly given a brand new engine for a birthday present. I should add that neither of our wives are exactly enthusiastic about model aircraft, tolerant is a better word, but the effect of the new engine was electric. It allowed the machine to lift off easily on the mangle stand and promptly tore the gearbox pinion from its shaft and damaged the clutch. A new input shaft was turned-up on the lathe and clutch meticulously overhauled.

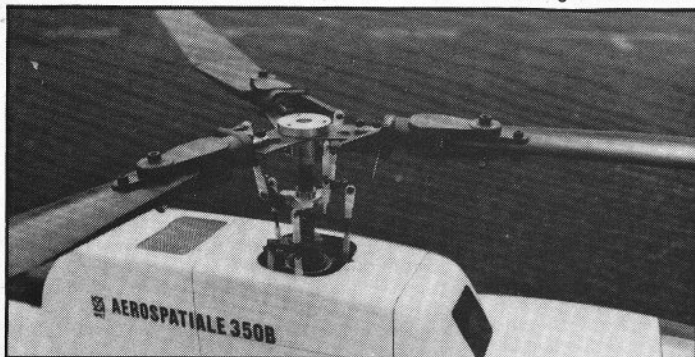
"Then came a number of very successful flights by my son and the beginning of a self-training course for me. I think it was in late

Society Rotorcraft Section, have circulated a pro-forma to be completed by the 18 registered competitors about their entry. I know of some very far from finalised. Apparently the finals will now be at RAF Finningley near Doncaster.

It is surprising what problems come to light following second thoughts upon this competition, the only primary specification being to hover for as long as possible with a machine of 5kg take-off weight. Apart from pilot fatigue, or failure, as mentioned in this column when first discussed. For example, you need big Ni-Cads to last as long as you hope they have to, and the power requirement change is pretty dramatic too as the fuel is used up. Should be an interesting event seeing how different entrants cope with the problems.

## Noises

Most of the time our model helicopters sound like any other model aircraft, that is, the dominant sound is that of the two stroke power unit. However, the helicopter is flown, usually, closer than a fixed wing job and the overly or spread is not so great, and the general noise pollution is therefore less. This means that the person receiving most of that noise pollution is the flyer himself, or herself as the case applies, and is therefore more likely to be tolerable than objectionable. The engine noise must be kept down so that we can relish the characteristic helicopter noises. Characteristic helicopter noises are



Right: hovering about signature really exists. Photo International Helicopter Magazine.



Left: Mick Harris made this three bladed rotor using Kalt blade mounts.

the model a vertical movement of  $\frac{3}{4}$  in., and fore and aft of about 6 in. Then in December it was decided to taxi it about, my son was the pilot already skilled at flying fixed wing whereas the only thing I had flown was a kite. He successfully skidded it about on a large frozen puddle near a manure heap for about 30 minutes, with a few pit stops, and then suddenly cried 'I've lost it — I can do nothing.'

"Vibration had played havoc with the electrics and the machine was stuck on full forward, full right and full throttle. I don't think I have ever seen anything quite so horrible, it skidded straight into the manure heap and promptly lost one rotor blade, with the resulting crazy vibration it slowly shook itself to pieces while we watched. All we could do was talk and watch, fascinated. We agreed we could not go near it and it had plenty of fuel on board! This went on for some two minutes; it seemed like 30. First one scale fuel tank fell off, then the other one. The skids came undone, the silencer fell off and the tail rotor stopped turning. Meanwhile bits of manure were being flung about the place intermittently. Did we feel sick! The motor finally stopped when the fuel line came adrift; silently we collected the bits in the traditional plastic bag and went home. Next day I revisited the scene and recovered more parts from the manure heap.

"After a week's rest, while we tried to think

1977 that I was practising ascending to six or eight feet and landing again when I must have nudged the throttle too much. The machine shot up to about 20ft, and slowly rotated. Now any competent helicopter pilot can bring this state of affairs under control, but I think the unexpected event increased my panic and the model did a minor circuit at considerable speed, lost some height and hit the sugar beet alongside the airstrip. I was just pulling out but the sugar beet was very high that year, so she has spent a long time in the workshop with one rotor blade, an S-shaped fly bar and a bent cab."

The remainder of the letter was more routine but it does emphasise the amount of fun had over the years "even though at times it has been tinged with a bit of sorrow, but this has always been our own fault." Now there is an honest man!

## British Rotorcraft Museum

The winter newsletter informs us that the museum could well reopen in time for the main 1982 tourist season, but probably with limited facilities. The selection of aircraft continues to grow but they are particularly looking for a complete 'Wessex' airframe and ex-'Whirlwind' Gnome engines.

## Mini Rotorcraft Competition

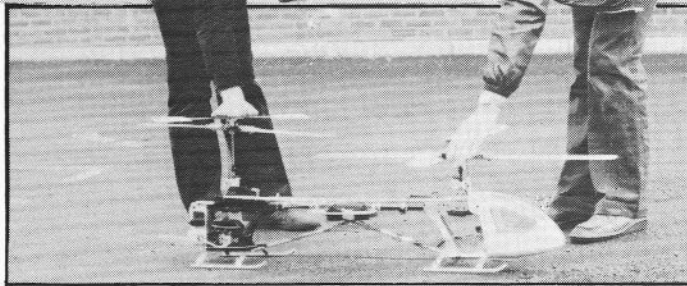
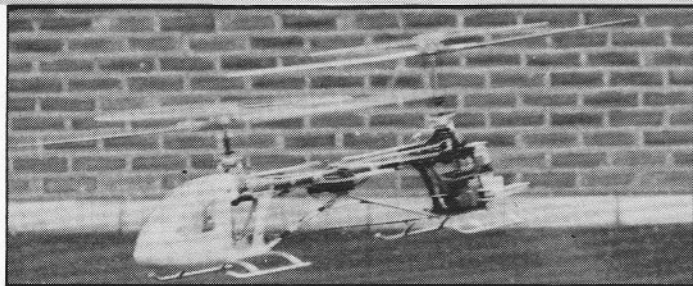
The organisers, the Royal Aeronautical

apparently classified into three overlapping types; namely vortex noise, rotational noise and blade slap.

Vortex noise is the swishing sound and is of high frequency and dissipates quickly in the air so cannot be heard from too far away. Tail rotor, fan and transmission contribute to this high frequency noise and it is a problem on full-size machines because of the passengers, but not to us.

Rotational noise is the swishing noise amplified, or pulsed, by the frequency of the rotor. As the harmonic content increases, the thumps sharpen into bangs, and eventually into blade slap. Rotational noise is the one we like to hear, and find exciting. I suppose a psychiatrist would associate it with a fast heartbeat, but I think it's because it signals the presence of an object of interest! Anyway, of low frequency (Rotor speed  $\times$  number of blades?) it is the noise that carries and signals the helicopter's approach, although because of the accumulation of engine noise etc. you probably knew there was an aircraft coming before that.

Rotational noise builds up into blade slap during certain manoeuvres, in models probably only in steep turns, but on full-size it is liable to occur in flare out prior to landing, shallow descents and high forward speed as well as steep turns. It is generated when the blades hit the vortex from the previous



Above: Tandem Kalt Baronette in experimental flight. Above right: "Will you or shall I?" John Griffiths and Nigel Brackley don't have any 'who does what' disputes at Slough R/C. Below right: plug to enable moulding of a glass fibre fuselage. Do the hooks show a lack of confidence?

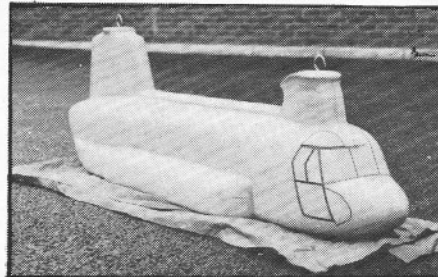
blade's passage, and results in local stall and supersonic flow. It is very noticeable on the 'Chinook' when the rear rotor meets the vortices from the front rotor.

Blade snap is not nice; quite apart from inducing vibration into the helicopter structure, it promotes problems with acoustic fatigue as well as being the principal reason for the objection to helicopters. On the other hand, a degree of rotational noise on models, if it can be of anything like the right frequency, is very desirable.

speed the safe height is raised again because there will not be sufficient time to lose forward speed before dictating the loss of height.

So you arrive at a height-velocity diagram something like that shown as Figure 1. The numerical values I have shown are only 'guesstimates' after allowing for differences between our models and full size helicopters.

Of course the kinetic energy in your rotor and your reaction times will considerably vary this 'Back to the workshop' curve, but twin engines with a certain amount of automatic control, which mine don't have incidentally, would just about eliminate the danger area for this one problem.



(the helicopter events in the SMAE Nationals were cancelled last year for lack of entries) and perhaps being able to practise a pure helicopter event, as opposed to an aerobatic schedule adapted to be difficult for helicopters, would be the answer.

The event proposed at the MACI AGM was as follows:

"The course to be laid out as follows: Using wooden skittles or brightly painted bottles approximately 300mm high.

"Mark a lift-off spot, and place 1st skittle 3m away, and 5 more skittles in line, 3m apart. Mark a pick-up spot 3m beyond furthest skittle. Place 6 skittles on alternate sides of the 6 laid out in line, each being 2m from the centre line skittle. (See Fig. 2.)

Flight: Lift-off and negotiate course between skittles to pick-up point approximately 21m away. Pick up object (provided by contestant) and re-negotiate course to lift off point. Deposit object at lift-off spot and knock down as many skittles as possible with the helicopter in the time left. Marking ceases when 10 minutes is called. Maximum height allowed on the course is 1m. Floats may be fitted but no other protrusions other than the skids are allowed."

Marks were awarded for each part of the course correctly executed and subtracted for each failure. Two runs allowed, best to count. It will be most interesting to hear how it works out.

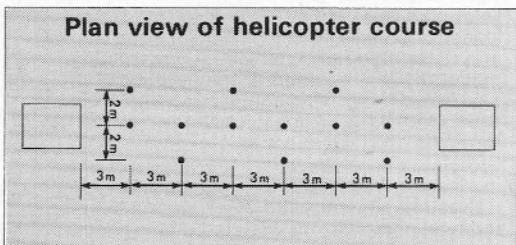
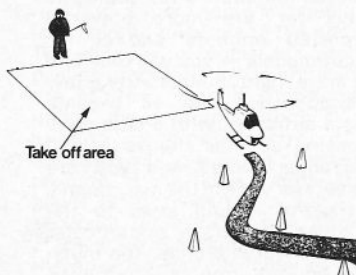


Fig. 2

Proposed helicopter course.

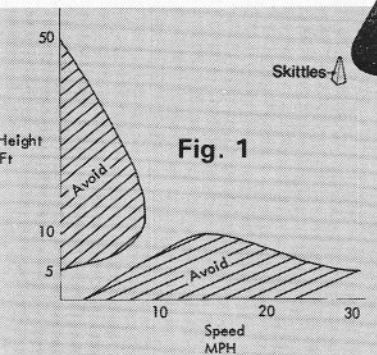


Fig. 1

"Back to the workshop" or "Deadman's Curve"

**Dead Man's Curve**

One of the questions I have been asked many times is why I make my twin engine helicopters. Possibly not all the queries come from people who know my liking for simplicity and want to know why I should make things more complicated.

There are several reasons, firstly because it's an interesting design exercise, secondly to make a different noise, thirdly in one case to make a more scale looking engine compartment in an open framework type helicopter, and last though not least, safety.

Yes, I know autorotation is possible, but it does depend on rotor kinetic energy which means high rotor speed and/or high rotor inertia, that is tip weights which I don't like, and there are many occasions when it doesn't help.

If the engine stops high above the ground, and the pilot can detect it quickly enough, rotor speed can be maintained by an increase in descent rate. If at low speed, the safe height is very great, or very low. If at high

Another interesting point about autorotation is that improving the flight efficiency of your blades by progressive wash-out of the section reduces autorotation ability. During autorotation the energy of descent is accepted into the rotor by the centre of the blade and delays the descent by lift at the tips. With wash-out or tapered blades, this transference of energy is less efficient and so the descent rate is greater. Perhaps the autorotation fanatics should try some wash-in?

**Irish sense**

It has been drawn to my attention (thank you) that the MACI (Model Aircraft Council of Ireland) are trying to promote a standard even for radio control helicopters.

This doesn't in any way restrict clubs from having different events, but it would mean that inter-club competitions would be less favourable to the home team. Does this happen? I don't know and I shouldn't think so, but it would be nice to have more people brave enough to compete in major events

**Tandem Rotors**

If weight of correspondence was anything to go by, then it would seem that more people are building these machines than anything else.

The latest to be drawn to my attention is a 'push-me pull-you' from two Kalt 'Baronette' and at a weight of 8lb. it flew on one engine! This hybrid is being made by the importers of Kalt, Slough Radio Control, they are using a control system more akin to the 'Belvedere' than the 'Chinook' — the difference is in the use of fore and aft cyclic instead of differential collective for fore and aft control. The model is a maze of mixers and, like Warren Bayley's Morley 'Chinook' of two years ago, didn't behave itself too well in demonstration which is a pity because it obviously will do, and I look forward to seeing more.

Slough Radio Control are planning to make a body for it also, a plug has already been made and no doubt fuselages will be available by the time you read this.