

HOVERING ABOUT with Jim Morley



YOUR REACTIONS TO this column have always been of great interest to me. The one thing they have taught me is just how different readers are one from the other, and that it is impossible to please all of the people some of the time and some of the people all of the time.

The reason for the philosophical start is the reaction to the mixed bi-monthly column at the beginning of the year. I am pleased to report that nobody actually wanted a refund of the cost of the magazine, I almost expected it, remembering the time somebody wanted compensation for travelling to an event that had been cancelled. So all comments have been taken as a compliment.

Over the years I have received critical comments for trying to blind readers with science, not being technical enough, writing with tongue in cheek, being too serious, wasting space on boring competitions, not covering competitions enough etc. etc. All of which encourage me to continue as is.

I have to admit that in the last column I chickened-out of something which sprang to mind and I'm telling you now because of the 'Man and his Models' story about Loof Lirpa from Sweden in that same issue. I was going to find a nice complex looking mathematical formula on stability, something like

$$\Delta N = \frac{1}{2} \rho c \left\{ \frac{dwp}{V} \left[- \frac{U}{V} (U_T C_T - U_P C_D) + \frac{U_P U_D}{V} \times (c + Mc) \right] \right\}$$

This was to have been fed with entirely irrelevant figures, to prove that in the southern hemisphere the rotor direction should be clockwise while in the northern it should be anticlockwise in order to get maximum stability.

Why? Well simply for fun, which is really what it's all about. It's true that I have always maintained that people fly model helicopters because it's a challenge, but overall it's in the search for fun, and the occasional joke can only add to that.

Why did I chicken out of including the stability feature? Because I felt sure somebody would take it seriously and accuse me of trying to mislead readers. Loof Lirpa has convinced me that I should have included it, and if a few readers enjoyed my joke as much as I enjoyed that one, at the expense of those who perhaps didn't catch on or hadn't heard of April Fools Day then it would be just too bad.

If Loof Lirpa had flown helicopters then no doubt he'd have had one with two rotors, one for when flying in his homeland and one

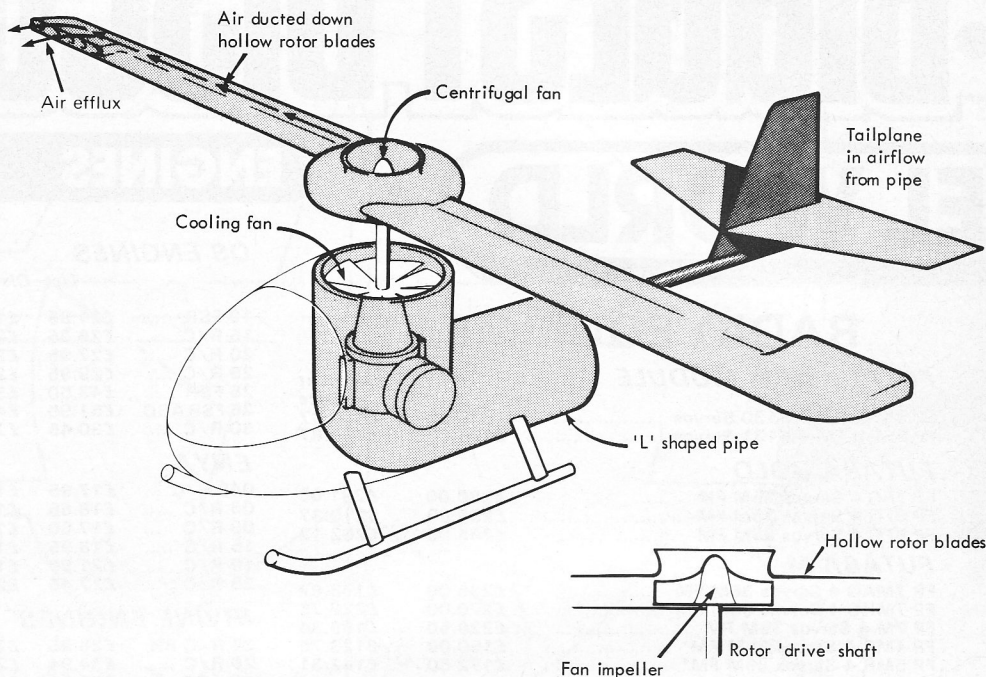


Fig. 1. Jim's Dream Machine. Experimental proposed model.

going the other way for putting into gear when crossing the Equator. Also his passport would have had automatic name reversal at the same time, but let's get on with Hovering About.

Bell XV15 Tilt Rotor

This device which I found so awe inspiring at the Paris Air Show some couple of years back has not as yet been modelled correctly. As I mentioned previously I know of one person attempting it but haven't heard of or

seen results yet. I was therefore most excited to receive the photos by Georges Chaulet, Antony, France and details of his model.

The excitement was tempered when I found that it was an autogyro and not therefore 100 per cent eligible for this column (autogyros can only hover when it suits them, rather than on command) but nevertheless it is obviously a worthy effort even without tilting its rotors.

The model is 1/7 scale and spans (?) 8ft. with a weight of 10lb and OS 90 power.

Georges says that take-off distance with a



Left: 1/7 scale Bell XV15 Tilt wing VTOL aircraft by France's Georges Chaulet. Model is 8ft. wide over rotors and weighs 10lb for OS90 power. Rotor angle is fixed and the model is flown as an autogyro. Above: Georges prepares the model for take-off while a friend holds the transmitter.

wind is surprisingly short though he finds the model something of a problem with directional control. A fin was added under the tail to help. The model has suffered several crashes and he claims to be the biggest rotor blade breaker in France, if not the world. (At 6ft.5in. I must be a contender for that last title). Anyway congratulations Georges on a most impressive model, I like to hear of adventurous types such as he. His interest now is on the cold jet type of helicopter, with a compressor at the rotor head and the air jet out through the blades to rotate them. Anybody else experimenting with this idea?



Four strokes

Another innovator is Trevor Butcher of the Southampton DMAC. Because there is a lot of interest, in noise levels, economy etc. in fitting four strokes to helicopters, I am pleased to relate his story.

He learnt to fly a helicopter during 1981-82, his model being the *Morley 2c* 'Bell 47G'. It was a film he made that convinced him that he would like the model to sound more like the full-size machines at Middle Wallop than an angry bee, and every flying session after that he became more and more aware of the unrealistic engine note and finally bought an *Enya* 60 4c four stroke.

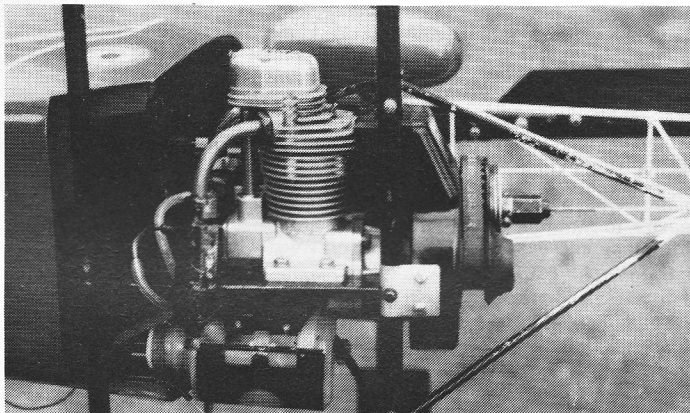
He writes:

"Three weeks work saw the modified air-frame complete with new engine ready for a trial run and possibly a low altitude hover.

I had run the engine in on the bench for several hours using a prop and everything seemed fine. The first attempts at flying the model were not very successful, due to the engine mis-firing repeatedly at hover rpm. Even worse, the throttle response was anything but progressive and the mixture adjustment very difficult to set. For the few seconds between misfires, the engine appeared to have plenty of power but torque reaction was almost impossible to control with the engine running so unevenly.

Back to the workshop, somewhat disappointed, the next week saw many variations of fuel, plug and mixture settings, each change followed by a tethered run up. On reading once again the recent articles on four strokes in RCM&E I decided to try a 0.010in. head gasket. This cured the mis-firing but

Right: Trevor Butcher's *Enya* 60/4c four stroke powered *Morley 2c*. Sounds much more realistic than the usual two stroke version. See text for full details of modification.



still the throttle response was poor. Looking closely at the *Enya* carburettor I could see no easy way of improving the mixture control and so opted for a new carburettor. A friend had a spare *Irvine* 20 twin needle carburettor which had almost the same choke area as the *Enya* carburettor.

With little modification, this carburettor was fitted and I was again ready for a tethered run up. The engine sounded much sweeter straight away and after full throttle and idle adjustments, responded very well throughout the whole range of throttle control. Following this, I flew the model with only a few further slight adjustments being necessary to the collective/throttle mix.

How does it fly? Slightly less power available than the *Irvine* 40 originally fitted but the exhaust note is just right, not too loud but still maintaining a slight crackle which to me sounds realistic. Rotor blade noise is more prominent with the quieter exhaust. I am sure further work on the engine will regain the slight loss of performance compared to the two stroke motor.

Whilst in no way suggesting there is no other way to do it, I have listed below the air-frame and engine modifications I found necessary.

(i) Engine plate offset 0.4in. to starboard side. This gives the necessary cylinder head clearance on forward part of tailboom as well as reducing engine overhang on port side.

(ii) Whole cockpit assembly moved forward 0.15in. to give a clearance between carburettor and cockpit bulkhead. This also helps the CG position and may allow removal of forward ballast if fitted.

(iii) Machine heavier flywheel for smooth tickover. Mine weighs 7oz.

(iv) Use *Irvine* 20 or similar type carburettor to improve mixture control.

(v) Fit 0.010in. gasket under cylinder head if engine misfires.

(vi) Modify clutch using heavier shoes.

(vii) Bend exhaust pipe to 90° to allow silencer to fit under the engine snugly.

(viii) Cut away excess material from gearbox frame and engine plate to reduce weight."

I have now seen the model fly and it sounds good. By the time you read this it will have had several public airings, notably the Southampton DMAC fly in at Beaulieu Aerodrome.

Next Fly-In

Even though this is the June issue, it could be that you are reading it in time for the fly in by the Winthorpe Model Flying Club at Newark, Notts. Successful event last year encouraging organisation of an event on May 22. Further details from D. Mills, 19 The Lawns, Collingham, Nr. Newark, Notts.

The British Rotorcraft Museum

The latest newsletter from this organisation includes plans for the new museum building on the A371 road into Weston-Super-Mare at Weston Airport. By the time you go on your annual holiday down to the west it could be that there is something to look at, though with the problems associated with such a project it's likely to be a board saying "Proposed site of..."

In the meantime the collection is growing, now to include the surrounding parts of the *Saro* P531 prototype and the pre-production 'Wasp XS 463'. Little things are urgently needed, like aircraft covers/tarpaulins, a 'Wasp' towbar, 'Scout' tailboom and instruments, not to mention the £1M to build the museum building!

Information, and incidentally helicopter posters and photographs, can be obtained, membership is still £2, from Mr. A. Norris, 27 Acer Road, Biggin Hill, Kent.

Somebody once asked me whatever happened to the *Fairey* 'Rotordyne.'

Apparently the museum now has the rotor-head from the only one built, together with a rotor blade which weighs 1500lb. A 'Chinook' blade is near a third of that. The museum will be at the Greenham Common Air Tattoo on July 23/24.

An opportune visit

I was recently very lucky to be at the right place at the right time. I was on one of my deviations from the world of model helicopters and talking business when my client, knowing of my interest, announced that shortly an *Agusta* 109 would be going on an instrument rating training flight and would I like to go along. Needless to say, business stopped.

I have to admit that reservations began to come to mind when the two pilots started to erect blinkers all around the one who was going to do the flying, it might have occurred to me that it was to be that sort of flight, rating the pilot not the aircraft instruments, but it didn't and by then I was installed with headset in the back passenger compartment where four people can sit in fair comfort on the smart two tone seats. I consoled myself thinking it wasn't the first time for them, and at least the second pilot could see.

Unlike winged aircraft and some piston engined helicopters, which are flown from the left, the 109 is flown from the right. This is due to convenient positioning of collective levers, throttles, instrumentation and the like but up to then, without much thought, I had assumed that all helicopters were flown from the left like the *Bell* 47G and the *Hughes* 300, which are the two I have noticed most. I believe some 300's can be flown from the right but normally the collective lever is by the LH door.

Anyway, start of engines, not unpleasant whine, as any turbine, muffled by headset of course. Gathering speed of rotor, blades going by above the windows with rapidly increasing speed to quickly become a blur. Absolutely effortless lift off with absolutely no increase in noise, vibration level, rotor speed or anything else. Flight only detectable by movement, very smooth, procedure hover taxi-ing to end of runway and fixed wing flight path take off, few hundred feet under-carriage up. I had forgotten the pilot couldn't see where he was going.

It was great, we cruised at 2-3,000ft. above countryside that I knew, proceeding from one radio beacon to another and the odd practice approach, not all of which were as accurate as I would have liked had we been in pitch black or fog, but OK if somebody would put a light on for you.

There was a slight 'beat' to the turbine 'whine' about 3cps, which seems to bear no relation to the four bladed head at 385rpm, which it is all the time, speed is controlled by collective pitch and attitude.

When the speed is the 'natural' one of 120-125 knots, the aircraft is really most comfortable, noise level being akin to a reasonable car on a motorway. At 145 knots (166mph) though, the vibration levels became a bit higher than I would have thought the air-frame could stand forever, the big cabin windows flexing in and out noticeably and noise level a little high for comfort.

For the final landing the sighted pilot took over, commenting how strange it was to fly from the wrong seat. Even with wheels, the taxi-ing was done a few feet up.

I wish all business trips were like that.

Incidentally, it is intended that not too far in the future, a series especially for those who haven't yet tried helicopters will alternate with 'Hovering About.'