R/C Heli Tech:

R/C helicopter Flying and Technology Justin Church

The last few months have been frantic trying to finsih and write up my new JR Vibe 90 helicopter which finally took to the air. I have been very busy selling cars, working sixty plus hours a week and have taken a break so this issue has an article by Stephen Green about flying your helicopter around the field for the first time. Until next month see you in the sky; Justin

First Circuits

One of the fun things about flying models is trying out new gadgets. After a couple of flights with a new Revlock rpm govner installed into my helicopter I concluded that little device transformed the way the machine flew. During the proccess I reflected on what it was like the first time I flew a circuit.

The model helicopter was a.40 powered fixed pitch Kavan Aloutette. Before taking a deep breath and pushing both sticks forward into the wild blue yonder I had been practising by slowly drifting the chopper downwind about ten to fifteen metres away then turned it around into wind and moved it forward. As it approached my position I stopped it into a hover then landed. As I got better at stopping I gradually increased the distance away which enabled me to gain more speed before stooping. When that was working reliably the take proceeded into wind then turned downwind and repeated the exercise.

When the machine was safely on the ground after that first circuit I caught my breath then went around for another. After a few more I began to wonder why I had been so anxious about it. Not that hard at all really, similar in many respects to a fixed wing aeroplane when in forward flight. The first time I overshot about twenty metres and I established a hover then lowered it on. A few times I became disoriented and remember watching the skids intently as some cyclic was applied to verify which way the machine was actually banking. That's a little tip by the way if you are not sure.

Once it got moving the amount of extra lift was quite noticeable and this became more apparent as the speed increased and when established in forward flight that machine needed about half right cyclic to maintain straight and level. When pulling the power back on final it was a bit of a juggle co-ordinating the cyclic and tail rotor to keep the glide path straight. A bit of juggling but easily manageable. I had quite a few flights that day and on what was to be the last flight, it threw a tail rotor blade, the boom disintegrated and the whole thing came down in a heap. Helicopters are much more reliable these days and modern rotor heads with collective pitch and helicopter mixing radio systems have made make the whole shebang a lot easier.

So you have spent months perfecting hovering and are just itching to fly forward and complete a circuit. Forward flight is easy to achieve, just tip the nose down and feed in a bit of collective and away she goes. The hardest part is stopping the thing in the right place, a fact you may have already discovered and has prevented you from making anymore attempts. Having taught a number of people using the system shown to me many years ago, it still works well. You can either go for a full circuit at slow speed or cut it in half and start on the final approach first, which would be my suggestion. The idea is to establish a head high hover then turn around and cruise away. Keep it slow so you do not get into translational lift.

If you usually stand behind or to one side of the helicopter, lift it off out of ground effect, rotate it with tail rotor ninety degrees to the right then slowly move it forward so the machine tracks way from you. No more than a gentle breeze is recommended and even the most basic gyro should keep the tail in check.

Standing to the rear left side lift the machine off into wind. You can let it drift downwind to the right or apply right tail rotor and proceed slowly forward.

Lift off the machine off into wind. You can let it drift downwind to the right or apply right tail rotor and proceed slowly forward.

Remember to keep the helicopter moving forward so keep the forward cyclic on, a couple of milimetres of stick travel should do it. Relax on the stick and it will just slow down and stop. Track ten metres and turn it around 180 degrees and fly back towards yourself. Limit the circuit height to no more than four metres. Two metres out reduce power slightly and either establish a hover in front or just past yourself or fly it on to the ground moving forward. If not comfortable hovering from the side I suggest practicing until you are although in the meantime you could swing the machine back around to your usually hovering position then land and collect your thoughts and try again. When you get the hang of that then lift off and turn left into wind, fly ten metres then turn right and proceed downwind past yourself. Turn back around and repeat the approach and landing you have just learned. Congratulations that is your first slow speed circuit.

From a flying point of view making both turns to the right is slightly easier but if you are not comfortable turning the machine directly toward yourself for a

few seconds, make both turns away from yourself ie a right then a left onto final. Remember not too fast, that comes later. The idea is to putt around at say 10 k.p.h. That's fast enough to start and the heli gets away pretty quickly even at that low speed My suggestion is to get comfortable with turning the machine in towards yourself.

Looking from the top if the rotor head rotates anti clockwise, at slow speed your machine will turn right by just applying right tail rotor. Technically the extra load may slow the rotor head down and power may be required to maintain altitude but small inputs should keep this to a level not worth worrying about. This suggestion will help keep the speed down during the first few attempts. Turning left at slow speed the machine should just rotate around as it did to the right or it may need a few additional control inputs if the speed has increased.

Technically when left tail rotor is applied the load diminishes and the rotor head accelerates if power isn't reduced. The machine will start to either climb or increase speed slightly, most likely both. At slow speed you may not have to make this adjustment but if it gets going more than likely you will have to make this adjustment. You may also need to apply a some right cyclic in the turn as most machines I have flown usually roll left when left tail rotor is applied in forward flight. Does this sounds a bit dramatic?

It can be if the machine gets a head of steam so knowing what may happen before getting airborne for a new exercise is always a good idea. It is very easy to build up speed and gain altitude when flying forward and once up there the pressure to get it down again increases ex potentially. This can lead to mistakes. From my own experience and that from teaching others if the machine gets away and you start running out of mental capacity there are a couple of escape plans. You could

Hold a few mm of forward stick and keep straight with tail rotor. Go about ten metres then turn it back around 180 degrees with left tail rotor and proceed back to the hover position where you started.

establish a hover but if the machine has covered some distance it will be hard to see so to my mind that is not a realistic option

The safest thing to do is keep holding forward stick and reduce power and when the helicopter starts descending aim it into wind and fly it back onto the ground. When the skids touch reduce the collective a little. The machine may bounce once or twice but it will settle back on to the training undercarriage and eventually stop.

Flying Faster

When you can lift off and perform a slow speed circuit try keeping it airborne and completing two circuits before landing. By the time you can do three in a row you should have experienced and recovered from a few scares, (which way it it going) and are now ready to push in more forward and proceed faster. Lift off, push in forward and apply power.

The helicopter will accelerate away then start climbing as it enters translational lift. Keep building up speed then turn right. Apply a little right cyclic and right tail rotor to kick the tail out, (it's a great look) and roll out heading downwind. Turn back around into wind and do another circuit or approach to land.

Maintain the forward cyclic and reduce power a little. The helicopter will descend and slow up a little. Hold the forward and establish the glide slope which hopefully will begin to replicate what you had been practicing at slow speed. To re-establish the hover easing off the forward cyclic will raise the nose and a slight reduction in power will establish a descent. You don't actually pull in aft cyclic rather a reduced the amount of forward stick.

On final about ten metres out and say four metres up the tail should appear slightly low, just below the horizon. If it is going to undershoot the hover point and you are not comfortable hovering nose in,(I wasn't back then) apply a bit of power, hardly any and ease in a touch more forward.

Too fast ease off the power and raise the nose a bit. Just before the heli stops it is time to reapply power and forward stick it back to level, in a hover. You will begin to notice the machine will want to slide left on final and it is normal to hold right cyclic on final. You may have noticed this tendency earlier but it will become apparent at higher speeds. You can apply some mixing that adds right cyclic when the throttle is below the hover point try 5% to start with. If your heli radio does not have this mix it would be available through a free mixer.

Skimming in on final it is also normal to hold left tail rotor and this can be reduce with mixing, usually known as Revo mix. If the machine hovers at half throttle set 5% left tail rotor mix as the throttle opens and 5% left when it is retarded, as a starting point. When power is applied to enter the hover both those controls will eventually be returned to somewhere around the neutral position.

With your flying experience to date, it

Cruise back to the hover, note tail boom slightly down as it stops. If not comfortable hovering from the side just apply right tail rotor and swing it back into wind.

The magnet and balance weight are held into the cooling fan with cyano.

Installed ready to go the Revlock is set up for a standard six channel heli computer set.

should have dawned on you that helicopter flying always involves holding at least one control, usually it's all four and that returning the controls to somewhere around the neutral position is as accurate a description as I could say. Mixing certainly does make the helicopter easier to fly more accurately. It is immensely satisfying to be able to lift off and fly around the field, watch it scoot past you with blades whirring then pop it back on the skids. Get that under your belt then if your radio system has them, flight modes open up more possibilities. One of my favourites is to scream in and stop rapidly.

I have not been to a helicopter field for many years so cannot say what the usual method of teaching circuits is. There well maybe a better way but if you don't have access to a helicopter club this system has worked for the people I have helped along the way, event he guy who writes this column.

Constant Speed Rotor.

If your helicopter is set up in beginner mode (that is low rotor rpm and little if any negative pitch) it is still capable of flying circuits, just as I did many years ago. Manouvres such as fast steep descents or rapid stops require are really beyond the capabilities of that setup to be executed safely. Mainly because the rotor rpm can decay rapidly with the large power-pitch reductions and increaases required to perform such manouvres. Once you have got a few circuits under your belt it will become apparent you can only pull the power back so far to descend. When you start to whip it round fast then pull up and the rotor speed bogs down it's time to have an look at the set up.

I am not into aerobatics but love booming around. I am certainly no expert although working from the suggestions from the radio instructions and tinkering with pitch and throttle curves has worked okay but it rankles me when the engine overspeeds. It just doesn't sound right when the airspeed is reducing and the engine is accelerating. I thought I might try an engine governor.

The CSM Rev Lock is a small solid state device that uses a linear magnetic sensor that measures rpm from a small magnet. The magnet is installed in the engine cooling fan by drilling a hole then superglued in place. The unit has a manual mode for use with entry level six channel helicopter radios such as the Hitec Optic, JR 2610 or Futaba 6 exa.

For radios with more channels two independently configurable modes are available plus optional variable speed by way of a slider or knob. The unit is very easy to install and the instructions are simple to follow. The unit will give excellent results with modest speed servos such as those supplied with such sets. My helicopter is small machine with a 3cc engine through a 12-1 gear ratio and JR 2610 with standard ball raced servos.

Read the instructions carefully and take time to have it sink in but having said that the unit is reasonably fool proof and very easy to install. I was bit surprised that a counter weight was listed as an option rather than supplied OEM and that may not be a real issue but I thought it would be preferable to start without the burden of an unbalanced fan and installed the optional balance weight.

Engine running and rpm set for fifteen thousand the Rev lock takes over and in a few seconds I was pushing the pitch expecting the machine to lift off. It wouldn't so a reset to seventeen thousand for a rotor rpm which translated to one thousand four hundred and sixteen rpm and I tipped it forward and blasted away only to find the engine sagging during the climb. One thing you must be aware of is the ability of this device to mask lean engine settings.

This is adequately highlighted and covered in the instructions. For the first flight you just disable the unit by pushing the button then after setting the needle valve then land and switch the governor back on. Flying around uses more throttle than hovering so it pays to get this right before blasting off. One way to check is to establish the hover then open the tap and blast up a couple of metres. Dont hit full pitch go for three quarter just in case the engine cannot cope with full pitch.

If the engine sags its probaly a bit lean. If After ten flights I have had the engine sags twice so it pays to be aware of this. The second time was late in the day when the air tempurature had reduced. Judging by the sound of the engine the unit copes with reasonably brisk changes in throttle position and maintains the set rpm very well. Flying around with a constant engine noise has increased the enjoyment level considerably and fitting the Revlock has transformed my approaches. Slowing into the hover without drifting all over the has suddenly become much easier as has booming in and decelerating with the tail boom hanging low before hitting the brakes. Check one out I say it's worth the small investment. Until next time

See him in the Sky. Stephen Green