MEMBERSHIP SECRETARY'S ADVICE FOR RC BEGINNERS AT OMFC

Please note that the following advice reflects the view of the Membership Secretary alone; it is not endorsed by the Club or the Committee. Other experienced RC flyers may hold other, and equally valid, opinions and newcomers are advised to seek alternative views before deciding which training methodology to adopt. This advice covers, to varying degrees, the following aspects of RC flying: fixed-wing power; powered gliders; pure gliders; slope-soaring; helicopters and multi-rotors.

RC flying is an incredibly rewarding hobby which offers a huge range of possibilities; amongst our members, you'll find flyers who enjoy scale, gliding, aerobatics, helicopters and multi-rotors. However, most beginners find that, initially at least, flying RC models is quite challenging. While the mechanics of controlling a model aircraft are relatively straightforward, a remote-controlled aircraft provides the flyer with no physical feedback from the controls. This is totally unlike a car, a bicycle or even a full-sized aircraft, and it makes the amount, rate and duration of control input difficult judge. Other areas of difficulty are: (i) confused orientation, particularly when the model is coming towards or passing you; (ii) allowing the model to fly too far away from you; and (iii) misjudging the effect of wind, which can cause quite dramatic changes in groundspeed and track.

Of course, if you've previously operated RC cars or boats, you'll have a head-start but, whatever experience you have with other types of remote-controlled vehicles, OMFC strongly recommends that you don't attempt to learn by RC flying by yourself; indeed, if you have little or no experience, merely setting up the model properly prior to flying can be a significant hurdle. Models that are sold as 'Ready to Fly' (RTF) are sometimes not as 'RTF' as they should be, and we would suggest that any new model should be checked, and preferably test-flown, by an experienced RC pilot before any attempt is made to fly it. Finally, it's certainly worth reading the BMFA Handbook's advice on RC before you start flying, in particular the safety aspects and how to check your model before and after flight.

Unfortunately, OMFC does not have a structured training programme for beginners; however, there is plenty of help and advice on hand from our experienced RC flyers, and we are fortunate to have two qualified instructor/examiners. Indeed, we have a good track record of bringing flyers along to the point where they can pass a BMFA Achievement Scheme test.

PC Simulators

Before attempting to fly an RC aircraft of any description, I strongly recommend that you use a PC-based RC simulator to help get to grips with the basics - especially orientation (ie which way up the model is, which way it's going) and control input rates. PC-based simulators are a great way to prepare yourself to fly a real model; however, to get the best out of them, you need to use one that interfaces with a 'proper' RC transmitter - a normal PC joystick or game controller will work but it isn't really good enough for our purposes. Ideally, you should use the same transmitter that you intend to use for 'live' RC flying. To do this, you'll need to purchase a lead and a USB interface that is compatible with your system. Again, an experienced club simulator user would be able to advise and help you to set it up. It needn't cost a fortune; in fact, two of the best RC simulators are free downloads (try PicSim or Multiplex MULTIflight); both of these may be linked to a suitable transmitter using a cheap interface and lead. Wireless interfaces are available, but these are a little more expensive.

Screenshot from Picasim

Lightweight 'Foamies'

If your interest lies in learning to fly fixed-wing models, either powered or gliders, you should consider purchasing an inexpensive lightweight EPP foam ('foamie') electric-powered model that weighs less than 250g. At the time of writing, the F595 Sky King and the XK A800 models are both popular at OMFC. These models may look like toys but, when correctly set up, they fly well and are capable of thermal soaring in the right conditions. For the beginner at Port Meadow, the advantage of these models is that the flyer doesn't need to be registered with the CAA, no competency tests are required and OMFC does not require the flyer to hold a BMFA RC Achievement Scheme certificate to fly alone (a brief check from a certified flyer is all that is required). These models are reasonably crash-resistant - especially those with over-wing mounted motors, where the motor and propeller are situated out of harm's way. Lightweight foamies are good for learning many of the basics and for gaining confidence. Should you have a mishap, their light weight and low inertia means that damage is less likely to occur, and they are easy to repair if it does. However, it's important to understand their limitations. With their low flying speeds, they can be difficult to fly in windspeeds in excess of 8-10 MPH, they're susceptible to turbulence and their small size means that orientation can be challenging if they fly too far away from you. Theoretically, it's possible to use one of these models to take a BMFA Achievement Scheme A(SFE) Test or, if it has a stabilisation system that can't be turned off, a Basic Proficiency Certificate (BPC). However, I don't recommend this because the test profile requires you to fly up to about 400ft, and orientation would be very challenging at that height; moreover, the need to fly in light winds would limit your opportunities to take the test.

XK A800 Lightweight Foamie

Fixed-wing Trainers

Before you fly any model with a mass in excess of 250g, you'll need to register as an 'Operator' with the CAA (cost £9), display your Operator Number on the model, and take an online CAA Competency Test ('Flyer ID') OR a BMFA Recognised Competency Certificate (RCC) Test. We recommend taking the BMFA RCC because it is focussed upon the regulations that apply to us – ie the BMFA's Article 16 Authorisation. Note that your Operator ID number is valid for one year, and your Flyer ID (or BMFA RCC) is valid for three years (at the time of writing).

Tempting as it is to start with a Spitfire, Sopwith Camel or Mustang, don't; scale models are not usually designed with ease of handling as a primary consideration, and they are liable to be more fragile. Also, don't be fooled by manufacturer's claims that their models are 'easy to fly'; in handling terms, the model might indeed be easy to fly, but that's only one aspect of RC model flying; the problems of orientation, distance and wind effects still apply. Traditionally, the best type of fixed-wing RC trainer is a simple high-wing monoplane with 3 or 4 channels and weighing about 1.5 to 3kg. A 3-channel model normally applies control to the throttle, elevator and rudder, while a 4-channel model applies control to the throttle, ailerons, elevator and rudder. Thus a 4-channel model properly replicates a full-sized aircraft. Either type is suitable for learning; 3-channel models are considered a little more stable, but they can be less precise in their response to control inputs. As you progress beyond basic flying, you'll find that the 4-channel model is capable of more manoeuvres.

Tempting…..but perhaps not ideal for training!

Perhaps counterintuitively, larger models are often easier to fly because they are more stable in turbulence and easier to see at a distance. Of course, practicality is also an important consideration, so the model shouldn't be too large; they need to be small enough to transport, and it's a longish walk from the Wolvercote car park to the Patch! For the Meadow, a trainer with a tailwheel undercarriage is strongly recommended; the tailwheel setup is simpler, copes better with rough ground and is more robust. Also, it's worth considering changing a small and fragile tailwheel for a tailskid. Electric power is recommended; while I/C has its attraction, the flying times are limited under the current club rules whereas electric-powered models can be flown at any time. Finally, many ARTF trainers are often made from white EPP foam, and their decals tend to be designed primarily with looks and style in mind. Many people find that brightly-coloured stick-on panels, with different colours on the top and bottom of the wings, are more helpful for visibility and orientation.

Max Thrust 'Riot' Trainer….a much better bet for beginners

Another approach to fixed-wing RC training is to use a powered (electric) glider and, if you are primarily interested in flying gliders, then this is clearly the best option. The same considerations regarding control apply, but trainer gliders tend to be a little more sedate in their flying characteristics and response to control inputs, which gives the beginner more time to think and react. Importantly, a glider's ability to thermal soar can, in the right conditions, extend flight times considerably. With no wheeled undercarriage and slower landing speeds, this type of model is also ideal for flying at Port Meadow. Regarding the choice between 3 or 4-channel models, both set-ups have their advantages; however, thermal soarers are often flown with only 3 channels (throttle, rudder and elevator) because the setup is lighter, ailerons can induce significant adverse yaw, and their greater natural stability is a boon when the glider is at height and difficult to see.

3-channel foam electric glider – recommended for beginners

As a ‘traditional' modeller it pains me say it, but Almost Ready to Fly (ARTF) foam models have some significant advantages over traditional built-up ones. Foam models are more ‘crashworthy' and easy to repair, and you don’t have to spend weeks building them. If you buy a well-known type, good flying qualities are almost guaranteed. Of course, they lack the ‘emotional involvement’ of flying a model that you've built yourself, but that can come later. There are some ARTF model that use traditional balsa and ply construction, but my advice would be to steer clear of these unless you have some experience of traditional model aircraft building. They can be more fragile and, without a paper plan and construction details, they are often more difficult to repair.

Finally, a word on autostabilisers and autopilots. To help clear up the misunderstandings that can arise with respect to these terms, an ‘autostabiliser’ helps you to fly the model by smoothing out its response to turbulence, whereas an autopilot flies the aircraft for you. In general, my personal recommendation is to avoid using autostabilisers for training, unless you are learning on your own with no assistance from an experienced flyer – which I also don’t recommend. A properly designed trainer shouldn’t need autostabilisation; indeed, it can interfere with your own control inputs. There is a danger that it can become a psychological crutch, and it won't help with one of the main problems in RC flying - ie the model 'getting away' from you. Finally, an autostabiliser won't save your model if you make an incorrect control input when flying close to the ground. When you’re learning, it's better for you to try to resolve any difficulties yourself and, if you can’t, allow your mentor or instructor can take charge. Of course, you can fit one if you really want to; the option is yours, and if you intend to learn on your own autostabilisation has some benefit, especially if you want to fly smaller models in turbulent conditions. Autopilots are ubiquitous on multi-rotors, but far less common on fixed-wing models. Some newer autopilots have some excellent facilities such as a ‘panic button’ and a ‘return to home’ capability. The ‘return to home’ capability is particularly interesting in cases where visual or radio contact with the model is lost; however, for the present, the legal status of such a system is uncertain; under present legislation, you must always remain in direct visual contact with your model and a radio failsafe system must the move model’s throttle to ‘idle’.

Learning to Fly (Fixed-wing)

Before flying, it’s worth reading up a little on the theory of flight, how an aeroplane’s controls actually work, and the importance of weight and balance. Understanding how your aircraft flies and how it is controlled is of great benefit; even RTF and ARTF models sometimes have poorly set-up controls and incorrect balance points and a little knowledge can help you to identify and resolve these problems. This can save a lot of trouble, frustration and expense; also you'll understand the reasons behind the seemingly strange features of some models, such as why the motor mounting is slightly offset, why the wings are slightly twisted and why the electronics and battery are squashed together near the front. Thereafter, the best way to learn to fly is through advice/help from experienced fliers, thumbs on sticks, and learning from your mistakes. The ideal way is to fly with a qualified RC instructor using two transmitters linked with a ‘buddy lead' (or other connection) that allows control to be switched between trainee and instructor. It is occasionally possible to do this at OMFC, but we have a very limited number of qualified instructors and buddy-lead systems are not always available. That said, we do have a number of very experienced flyers who are willing to instruct, monitor and mentor those who are taking their first steps into RC. Some may be willing to use buddy-leads, but this relies upon having two compatible transmitters that are set up to work properly together. Most of the time, this is not the case, and it’s common to share one transmitter between instructor and trainee. Consequently,

the more preparation that you can do using a simulator and/or lightweight foamies, the better, and be prepared for some mishaps along the way.

Learning Flat-field (Thermal) Gliding (see also 'Lightweight Foamies' above)

Port Meadow is a superb site for thermal gliding. I'm probably going to upset the purists amongst us but, in my opinion, the easiest way to learn thermal soaring is by starting with an electric glider. I recommend a 3-channel model (rudder, elevator and throttle) with a 2-metre or larger polyhedral wing. You can opt for extras such as spoilers or flaps, but in the early stages these features are, in my opinion, an unnecessary complication which can stop you from absorbing basic height and speed adjustment techniques. The larger span will help you to maintain orientation as the glider climbs away from you, while a polyhedral shape will give the glider good natural stability. This is very useful when the glider is at height; such a wing damps out the glider's reaction to thermal turbulence and gives you sufficient time to observe its attitude changes and react accordingly. Since the ability to fly aerobatics is not a priority in a thermal glider, aileron control is unnecessary and the extra components add weight and complexity. I would recommend progressing to take the BMFA Achievement Scheme A(SFE) test using your electric glider; under OMFC's rules, this will enable you to fly a fixed-wing model without a certificate-holder being present. Then you'll be ready to move on to a proper high performance pure thermal glider of your choice.

3 - Channel electric thermal glider with 2m polyhedral wing. Ideal for beginners

For pure gliding, probably the easiest method of launching a thermal glider is to use a bungee; however, this requires special care. Not only is a bungee potentially hazardous if you don't use it correctly, but also OMFC Rules state that that the bungee launch area must be marked by five flags, and that two people must be present. This might seem excessive, but the reason for the clearly visible markers is to warn walkers, dog-walkers and joggers of the potential trip and entanglement hazard. The second person, who does not need to be a club member, is required to ensure that the bungee can be removed quickly should any cattle or horses start to move towards the operating area while you are flying. Note that smaller hi-start launchers are permitted for lone flying. Another launching method is to use a towline; however, this requires a reasonably fit helper who will, given the requirement to run on uneven ground, be at risk of a fall and subsequent injury. Finally, the increasingly popular Discus-launched Gliders, or DLGs, offer a hassle-free alternative to bungees, motors and towlines….albeit at some expense.

Learning Slope Soaring

Port Meadow is clearly not suitable for slope soaring; however, in my opinion, any budding slope soaring enthusiast would be well advised to learn the basics of RC fixed-wing flying, using either a traditional RC trainer, or an electric glider, before venturing out into the hills. Also, it's worth practising slope soaring flight patterns, approches, landings and go-around procedures on a PC-based RC simulator. Picasim in particular focuses on gliders, and its 'cliff' scenery is particularly good for this type of practise - provided you turn down the turbulence and rotor streaming settings.

Our nearest local slope-soaring site is Wittenham Clumps, which is about ten miles south of Oxford. It's a fairly small area comprising two lowish hills, one of which is a former iron-age hill Fort. The site is not dedicated to us; anybody can fly there. It's owned by the Earth Trust, and slope-soaring has taken place there for many years; however, the rules for using the site are unclear except for the fact that the Earth Trust bans 'drones' from its sites. Consequently, OMFC advises its members to stick to the National Trust guidelines – ie no powered flying (including no electric models).

It's not a perfect site; the best slope, which is on the north-westerly hill, needs a north-north westerly to north-easterly wind which is infrequent in the UK. Also, the landing areas are comprised by vegetation and both hills can become very busy with walkers and picnickers. If you're learning, it would be worth making a few journeys to a more suitable site. That said, in the right conditions and with the right glider, it's possible to achieve success. The south-easterly slope (the hill fort) is best for the UK's prevailing south-westerly winds, but the ramparts cause turbulence and the ditches are filled with brambles. As you might expect, 'floaty" gliders are good in light winds, and foamies have the advantage of being able to cope with less-than-ideal landing areas....such as the brambles! It's possible to fly faster models at the Clumps, but I'd advise confining these to less busy times. On the positive side, the views are superb.

Learning to Fly Helicopters

RC helicopters are not my area of expertise; however, I do have some experience with them. As with fixed-wing models, if you're serious about learning to fly helicopters it's worth trying to understand the basics of how they fly. That way, you'll understand common terms such as 'CP' and 'co-axial'. That said, if you're just dipping into it, there's no need to do this; most RTF helicopters will fly 'out-of-the-box' and you probably won't need to adjust anything. Once again, I must emphasise that what follows is my opinion; other opinions are available!

For me, the best way to start RC helicopter flying is with a lightweight, indoor 4-channel coaxial helicopter and a PC-based RC simulator. In this case, the best free download is probably MULTIFflight, since Picasim doesn't feature any helicopters. A 4-channel control setup replicates a full-size helicopter and, importantly, more advanced helicopter models. I strongly recommend that you don't buy a 2 or 3-channel helicopter; the control inputs are different and you'll need to un-learn the skills when you fly a 'proper' helicopter. Manufacturers of cheaper 3-channel models often obscure this in their marketing material by using terms like 'full control' or 'all-axis control'; look instead for helicopters that offer control in pitch, roll, yaw and collective (in broad terms, 'collective' means a combination of throttle and vertical flight control...ie up and down). A coaxial helicopter has two main rotors: one on top of the other on the same shaft, and they rotate in opposite directions. This feature counteracts torque, so no tail rotor is needed. Stabilisation is usually provided by a simple mechanical device called a 'flybar'; some are 'flybarless' which merely means that stabilisation is provided electronically.

An indoor coaxial helicopter enables you to learn the basics of hovering in the comfort of your own home; you can either seek help from another flyer or teach yourself, perhaps using one of the plethora of internet videos. However, it's important to understand the limitations of an indoor coaxial helicopter. They are usually immensely stable in the hover, but forward flight performance is limited and their light weight means that an easy solution to losing orientation and/or control is to simply close the throttle because crashing onto the carpet usually doesn't cause any damage. Unfortunately, this is not true with regard to larger helicopter models, and it's a bad habit to learn. Moreover, convenient as it is to fly indoors at home, it means that you aren't exposed to outside-world environmental factors such as wind, turbulence, sun dazzle and loose dogs. That said, a small indoor helicopter can generate a surprising amount of turbulence in an enclosed space, and walls, furniture and lampshades have an unexplained magnetic effect on them.... You can't use a coaxial helicopter to take a BMFA Achievement Scheme A Test, mainly because the BMFA considers them too easy to fly; however, if you wish, you can use it to take a Basic Proficiency Certificate (BPC) Test.

Typical indoor coaxial helicopter (note the black 'flybar' above the rotors).

Once you're ready to move on to a single-main rotor helicopter and into the outside world, you'll need a larger machine. A single-main rotor helicopter is quite a big step up in terms of flying skill, so it's wise to have an experience flier with you from the outset. In my view, the next sensible step is to move to a 'fixed pitch' model. For those who don't know about such things, I'll attempt to explain. In a full-sized helicopter, the pilot controls it in azimuth by tilting the rotor disc in the required direction. This is achieved by applying appropriate pitch to each of the main rotor blades in turn (or 'cyclically') using the stick (known as the 'cyclic' in a helicopter). The pilot normally controls the helicopter in the vertical plane by changing the pitch of all the blades at the same time (ie 'collectively') using a control called the 'collective'. The 'collective' is in fact a combined control; it applies pitch to all of the main rotor blades, and increases the power to maintain the rotor's spin speed. As you can imagine, the mechanics behind this are fairly complicated. An RC model helicopter which is controlled in this way is called a 'Collective Pitch' or more simply a 'CP' helicopter and these are the most advanced types of rotary-wing model. However, many other RC helicopters use a much simpler 'fixed-pitch' arrangement, whereby this complication is done away with almost entirely; as the name implies, the pitch angle of each main rotor blade is fixed; lateral control is applied by tilting the entire main rotor, and vertical control is achieved by simply increasing or decreasing the speed of the rotor by adjusting power via the throttle stick. Finally, something that comes as a surprise to many newcomers is that a single-rotor helicopter normally hovers with its nose slightly raised and with one skid slightly low. Don't worry; this is normal.

Typical fixed-pitch helicopter

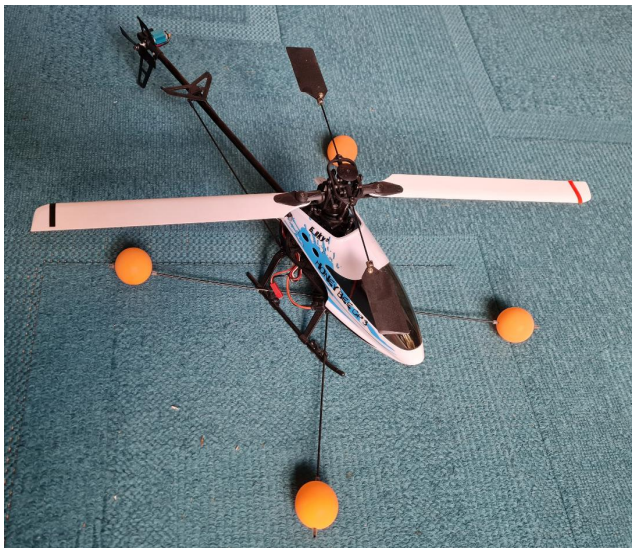
A fixed-pitch RC helicopter is, in general, easier to hover than an equivalent CP model. In forward flight it's a slightly different story; fixed- pitch helicopters can be harder to turn in one direction than the other, their handling is generally less precise, they are more prone to an effect called 'power settling', and they cannot enter autorotation. However, since hovering is usually the biggest challenge for beginners, a fixed-pitch helicopter is probably a sensible 'second step'. When it comes to hovering, I strongly recommend the use of 'training gear', which comprises two rods with lightweight balls on each end, fitted in cruciform underneath the landing gear. This should help to prevent the

helicopter from tipping over if you mishandle it during take-off or landing. As with a fixed-wing model, learning from a qualified instructor using a buddy lead is the ideal way, but it's not always possible. Provided you are careful, and that you don't try to run before you can walk, you can learn successfully using a single transmitter with help from an experienced flyer. You can progress a long way with a fixed-pitch model, and it's ideal for taking is ideal for taking a BMFA Achievement Scheme A Certificate (Helicopter).

One important item regarding RC helicopters that I've not yet mentioned is the tail rotor. On a single main-rotor helicopter, the tail rotor is used for two purposes: to provide a force to counteract the tendency of the helicopter's body to turn in the opposite direction from the main rotor (iaw Newton's third law of motion), and to facilitate yaw control. In a full-sized helicopter, the tail rotor is always driven from the helicopter's main gearbox by means of a driveshaft and a system of gears. This ensures that it is driven at the correct speed. Larger and more advanced RC helicopters use a similar system; it gives the best performance and the most positive control. However, there's no escaping from the fact that model helicopters are prone to suffer from mishaps, and the long driveshaft with its bearings and gears is vulnerable to damage. Also, if the tail rotor comes into contact with an obstacle, shock damage is likely to occur not only in the tail rotor drive system, but also in the main gearbox. For this reason, RC helicopter tail rotors for smaller helicopters, and those aimed at beginners and improvers, are normally driven by a flexible toothed drive belt or a dedicated electric motor. Of the two, belt drive gives the best response, but dedicated drive motors are simpler, cheaper, and improving. They are especially well suited to small helicopters. Controlling a helicopter in yaw is very difficult; consequently, virtually every RC helicopter on sale today has some form of electronic yaw stabilisation. This is sometimes called a 'directional gyro'...even though there is no physical gyroscope on board.

Once you are confident with a fixed-pitch helicopter, you'll be ready for CP. CP helicopters can be quite 'twitchy' in the hover, but once in forward flight they are easier to fly, more agile and can fly manoeuvres that no full-sized helicopter is capable of. Usually, they may be flown in two modes: normal and 'throttle up'. In normal mode, they fly in a similar manner to a fixed-pitch helicopter, but with better response and superior forward-flight characteristics. In 'throttle-up' mode, they behave in the same way as a full-sized helicopter; the rotors are set to flying speed before take-off. Usually, they have a feature that no full-sized helicopter has: the ability to hover inverted with negative collective pitch. In this mode, RC helicopters are capable of performing the most amazing stunts.

Collective-pitch (CP) helicopter with electric tail rotor motor (note training landing gear)



Multi-rotors

In general, it's possible to fly a multi-rotor with almost no training at all; for the most part, they fly themselves. Exceptions include First Person View (FPV) drones, which are not difficult to fly but take

some getting used to, and FPV racing drones. We don't permit FPV drone racing, or racing of any kind, on Port Meadow because of the need to sanitize a large area; the Meadow is, of course, a public place and we have no power to do this. Please note that if you are interested in FPV drone racing, or any form of model aircraft racing, you'll need to look for an alternative site.

Although you'll need almost no training to fly a modern multi-rotor, it's important to understand that flying skill is only one aspect of safe aircraft operation. Given the less-than-rosy public view of 'drones', and the potential danger that they present, it's essential that you are fully familiar with the limitations of your multi-rotor, the regulations that you operate it under, and how to set it up and check it before and after flying.