

Tyldesley Model Flying Club.



‘Wings’ Training Scheme, Instructors Guide.

By Andy Ellison.

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INTRODUCTION

The *Tyldesley Model Flying Club "Wings Training Scheme"* was introduced to teach novices you how to fly their models safely and to give them a basic understanding of their equipment, its operation and its limitations. The course has been revised in 2015 to place more emphasis on achieving the nationally approved solo flying standards and consists of a series of progressive stages in a well-established and proven training syllabus. Consequently, when a pilot is ready for their flying test they will be able to undertake it as if it was just another training flight.

Towards the culmination of their training the novice will now undergo the British Model Flying Association Fixed Wing 'A' Certificate test. This precedes an observed +twenty flight assessment to underpin their training, establish consistency and demonstrate their adherence to local club rules and BMFA guidelines. Following this observed period there will be a discussion between them and their instructors to achieve a consensus and if all are happy, the club will clear them to fly with no further instructor supervision required.

At this point they will be a club certified pilot and be awarded their 'Wings'.

The national 'A' Certificate tests require the pilot to perform simple flying tasks and demonstrate to the Examiners that he is in full control of his model at all times and in various situations and attitudes within the ability of the model. They also require the pilot to answer safety related questions to demonstrate that he has a good knowledge of pit safety procedures, local club rules and the legalities surrounding model aircraft flight. All aimed at ensuring they are an extremely competent and safety conscious individual whilst maintaining the clubs excellent safety record. The club does not set the standard for this test as that is set nationally. We do however have certified BMFA Examiners who uphold that national standard and will undertake this aspect of the training syllabus

As a Tyldesley Model Flying Club Instructor, it is your responsibility to follow this training syllabus and train the novices up to and beyond the nationally approved 'safe solo' flying standard.

The aim of these guidance notes is to guide you in assisting Trainees to achieve this standard whilst at the same time normalising the training methods to some degree, to ensure good continuity between Instructors and a structured and monitored progression through the scheme. These notes will provide you with an insight into the problems associated with teaching novice pilots the art of R/C flying and how to best address them. They will also break down the training syllabus into simple terms and exercises which are proven to achieve the best results. This is not to say that there is no room for improvement, and as you learn to instruct the scheme you will doubtless develop your own methods. The trainees are informed that whilst various instructors will teach things in various ways, the end results will hopefully be the same. Good instructors recognise that their own ways are not the only ways (and in some cases not the best ways) of doing everything, and if necessary, adjust their methods accordingly.

It is imperative that you read this document in conjunction with the introductory booklet by Andy Ellison, titled 'The Tyldesley Model Flying Club Wings Training Scheme (V2 – 2015)'

THE TRAINING SYLLABUS

The scheme is broken down into 14 stages and progression through these stages is monitored on the novice's flight training record (Appendix 1). The originals of these flight-records are housed in the club caravan. This document also assists other instructors in assessing the ability of a trainee as well as providing the trainee with a visual record of their progress.

You should note that aerobatics may be taught throughout the training course at any stage deemed suitable by you as instructor. The inclusion of loops and rolls for example whilst practising circuit flying can only serve to alleviate boredom and give the novice a greater sense of achievement. It is not unusual for a novice progressing to stage 11 to be fully proficient in most of the basic aerobatic manoeuvres when they get to this stage.

You should also be aware that whilst some stages of this syllabus may be completed in one flight, that this does not set a precedent for the other stages. How long a Trainee spends at a particular training stage is very dependent on many various factors including, ability, type of model, attendance, weather conditions, Instructor availability. etc. Any Trainee unhappy with their rate of progression through the Wings training scheme is encouraged to take the matter up in the first instant with you as their Instructor.

You should also take account of regression if it becomes apparent that due to an absence from flying, your novice cannot perform a flight stage for which they have previously been signed off. In this instance it is quite permissible to impose a regression on the novice in conjunction with the agreement of another instructor.

Stage 1

Pit Safety. The Instructor will introduce the novice to the basic field safety rules and how they are applied. He will demonstrate the principals of radio use, model set up, engine/motor safety, the airworthiness checks and introduce the trainee to the national safety codes. He will also allow the novice time to read chapters 5 & 6 from the 'Up and Away' training manual.

Stage 2

Introduction to flight. The trainee will be introduced to the basic principles of flight. The Instructor will demonstrate the basic components of a turn, straight and level flight, cruising speed, the effects of power increases/decreases, the functions of the basic controls and the extents of the available airspace. The Trainee will learn the correct way to hold the transmitter, and be introduced to the concept of proportional control.

Stage 3

Trimming / Basic Circuits / Figure eight's. The Instructor will introduce the Trainee to the concept of trimming the aircraft for straight and level flight and performing the basic circuit in both the left hand and the right hand directions. The Trainee will learn the principals of the effect of wind on a model and demonstrate the correct use of the throttle. The Trainee will also learn the correct method of flying figure 8 circuits and judge how to vary the angle of bank dependent on the wind strength and direction to hit certain key points as determined by the Instructor.

Stage 4

Circuit transition. The Trainee will learn the correct methods of transition from one direction of flown circuit to another without height gain or loss by using procedure turns and half figure eight circuits.

Stage 5

Climbing, diving and Stalling. The Trainee will learn the principals of height gain and height loss through the correct use of the throttle and elevator. By the end of the exercise the Trainee will be able to double their height and halve their height in the same circuit. The Trainee will also learn the principles of slow speed flying near to and beyond the Stall point of their model. The Trainee will learn to recognise an incipient stall and the correct recovery from a fully stalled situation. The purpose of this exercise is to prepare the novice for take-off and landing .

Stage 6

Taxiing. If the model is suitable, the Trainee will learn the basics of the first stages of take-off, the taxi up to flight transition. Utilising the throttle and rudder controls to effect a steady, straight taxi run along the runway, the Trainee will develop the necessary ground handling skills to progress to the next stage. This exercise may initially be taught with the models wings removed.

Stage 7

Take off, climb out and manoeuvre. The Trainee will learn the skills required to transition the model from the taxi to airborne and into the standard circuit of the day. They will also acquire the knowledge of actions to be taken in emergency situations and the best means of recovery from them with safety in mind.

Stage 8

Landing approaches and overshoots. The Trainee will utilise the skills he has learnt to this point by performing accurate and co-ordinated landing approaches from various directions and situations. These will be aborted on the Instructors command and a high-power overshoot effected to return to a safe altitude.

Stage 9

Landings. The trainee will discover that this stage is a natural progression from stage 8. First landings are often performed from a perfect landing approach when conducting overshoot practice. This will then progress to practising landing approaches from various directions both powered and deadstick, into wind and crosswind.

Stage 10

Solo Flight. The Trainee will perform a consolidation exercise of everything learnt to date in their first solo flight. They will be under in-direct supervision of their Instructor who will be watching nearby. This stage is a major milestone in any pilots career and model flying is no exception.

Stage 11

Aerobatics. The trainee will be introduced to the concept of basic aerobatics and combine them with all manoeuvres learnt up to this point. Basic aerobatics will typically be loops, rolls, Immelman turns, Reversals and the Stall and recovery. Advanced aerobatics such as Bunts, stall turns, spins and inverted flight may be taught if the novice demonstrates an ability to take them on board but this is not mandatory.

Stage 12

BMFA 'A' Certificate. On agreement by the Instructors the candidate will be tested by a BMFA Examiner to the standards set out in the Nationally approved training schemes of the sport's governing body, the British Model Flying Association. The criteria for this test is set by the parent body organisation and not the club. The required minimum standards must be met in order to pass and does include verbal examination questions.

Stage 13

+Twenty Flights. The candidate is required to log at least twenty flights under the indirect supervision of a club instructor. The flights should be flown to BMFA 'A' Certificate standard and contain various elements learnt on the scheme, including basic aerobatics. The flights **MUST** be incident free and at least two different models must be used. Use of Electronic stabilisation is not permitted.

Stage 14

Sign Off. On completion of the required number of flights, a majority decision of the club instructors is required to complete the clubs training and gain clearance to fly with no instructor supervision. The instructors will be looking for consistency in the candidates flight safety and ability. If a candidates flying is inconsistent further flights may be required or further instruction may be given.

TEACHING THE SCHEME.

Teaching of the TMFC Wings scheme is based on the principals of :

Demonstration.
Imitation.
Recapitulation.

In other words you must demonstrate to the novice the manoeuvre you wish to see, then allow them to practice it, then re-demonstrate the manoeuvre to highlight their errors. There are however various factors which you should take into consideration which must be applied throughout the stages, and many points to note on the actual act of tuition.

You should study the following text carefully. While it will be most useful to recently appointed instructors, even fliers who have been teaching for some time should find many of the points raised useful.

General.

Just because you're good at something does not necessarily mean you can teach it. Some of the best fliers at our field freely admit that they do not have the patience to teach beginners. Additionally, teaching requires an ability to see things through the eyes of the beginner, and to modify your discussion accordingly. Some find this more difficult than others and you are encouraged to seek advice from more seasoned instructors if you are having difficulty.

Do You Have What It Takes?

There are many ways you can give back to your club, and instructing novice fliers is one of the most rewarding.

No two instructors will totally agree on how every concept along the way should be related, and this can sometimes result in the confusion of the trainee. The methods listed in this document aim to relieve this problem and to break down the instruction into small 'building blocks' if you like. This enables the Novice to assimilate the task more easily and provides a higher level of uniformity between instructors.

These methods have been proven during many years of instruction and have always worked well. But as an individual you should feel free to improve on them as you develop your own teaching style.

The goal of our Wings Training Scheme is to assist the student to the point where they can fly to quite a high standard by themselves, safely and without danger to others. Tyldesley MFC has always prided itself on the standard of fliers that we produce through the scheme, and we have fought hard over the years to keep these standards at the upper levels.

Let me point out that this text will stress the teaching of flying skills. We assume you can relate the basics of aerodynamics and flight, control surfaces, and in general, what makes an aeroplane fly. While we do offer some assistance for helping the beginner pick their first aeroplane, understand flying safety, and start & maintain engines, there will be many other things you need to relate along the way.

As you begin instructing, you will be amazed at how many precarious attitudes a beginner will get their aeroplane into. Depending on your flying skills, some of these attitudes will not be comfortable to you. TMFC does not actively use buddy box training methods and this in turn produces situations where you can do very little to save a model. As long as we keep the aeroplane high enough, the plane will never be in danger. However, as the student begins taking off and landing, you should make it very clear that there will be little you can do to save the plane when it gets close to the ground. More than likely the plane will be dumped (and damaged) several times before take-off's and landings are mastered. As long as the student understands this, you can work with them. However, if they show any sign that they may blame you for the plane's damage, you should consider stopping your instruction of them. This is not an attitude that we wish to promulgate within TMFC.

When to take control.

As the instructor, you set the rules for when you retake control. Early on, you should tell beginners that there will be times when they may be in control of the aeroplane, yet you will still wish to retake control. The first limitation you might impose is to do with the flight line. If it even appears that the student might eventually cross it and fly over the pits, you should retake control. While it is possible that the student may have been able to continue flying without crossing the flight line, you should not take any chances where safety is concerned. Secondly, you might set an altitude limitation. While learning how to turn, beginners tend to lose altitude in each turn they make. When the plane descends past a certain altitude, you should retake control, even though they may be doing rather well (this also gives them the goal of keeping the aeroplane above your cut-off point). Thirdly you might set a distance limitation. If the plane gets so far away that it becomes difficult to see, you should retake control. You may also want to set a similar rule based on your own comfort level. Tell the student that if they get the plane into an attitude you don't feel comfortable with, you'll retake control. This may not be caused by a problem or mistake on their part; you simply don't want the plane to get into an attitude from which you cannot recover!

As the beginner progresses, they may protest when you ask to retake control. They may (incorrectly) feel they are still in total control even though you know better. By the time they finally acknowledge that they are in trouble, it may be too late for you to save the aeroplane. You should make it very clear at the start that if the student protests when you ask for the transmitter, that you will stop helping them.

You control the pace.

Beginners tend to get a little anxious. You will eventually develop a feel for when a student has progressed enough to move on to each new stage. Until then, take it slow. If in doubt about whether a student is ready to move on, keep on the current stage until you are absolutely sure.

Patience is the key.

Beginners will have difficulty with things you find easy. This can be frustrating. If you show your frustration, beginners will soon lose confidence. You must constantly encourage beginners, stressing positive accomplishments to build on.

Be on the lookout for new ways to do things.

Believe it or not, the best way to thoroughly learn something is to teach it! You will be amazed at how many things you learn from a beginner's questions. They really force you to think through many things you may now take for granted. In order to explain anything, you really have to thoroughly understand it. For questions you can't answer, look to another experienced instructor for help.

Be sure you can fly out of trim aeroplanes.

If you have never taken a new model off by yourself, you shouldn't take a beginner's model up for the first time. It may be a good idea to practice on your own out of trim model first.

Keep their left hand on the stick.

Through the first stages of learning to fly, beginners will be predominantly using only their right hand. You will notice that they will tend to let their left hand stray away from the left stick. Urge them to keep both hands on the sticks. As they begin taking off, their left hand will be needed, and it will be easier if they are comfortable with their left hand on the stick.

Watch for the student's saturation point.

We all have a limit to how much new information we can absorb in a given period of time. Student's to RC flying are no exception. Keep in mind that your student will be concentrating very hard during practice sessions (especially on their first few flights). There will come a point when they simply cannot take any more without a break. One common symptom of this will be that the student has been doing just fine for about eight to ten minutes of flying. But all of the sudden, the student starts making mistakes (usually silly mistakes) not normally made. The student may not even understand why they are doing so poorly and begin to get frustrated.

As the instructor, you must be able to recognise when the student has had enough. It is often sufficient to take the transmitter for a few moments whilst the trainee has a short break, but more often than not you will find that the trainee needs a proper break and you should land the model.

Two steps forward, one step back.

You must remember that your students will have problems along the way to learning how to fly. At times, things you thought your students understood will seem to be difficult again (especially after long non-flying periods, or a sustained period of flying circuits in one direction). This can be frustrating for instructors so you'll have to show your patience when faced with this problem. One way to minimise the problem is to do a review of what the student currently knows at the beginning of each flying session. You can review on the ground with reference to the students training log, reinforcing the students knowledge as well as beginning the next flight by having the student do seemingly simple manoeuvres they already know. This also helps you begin a more complicated (and new) topic on a positive note. However, even with reviews, you must be on the lookout for times when the student needs to take one step back before they can move forward.

Fingers or thumbs?

As you teach a new person to fly, you should try to encourage them to hold the transmitter sticks with finger and thumb. We have found that persons flying with thumbs only have a propensity to induce some aileron control whilst pulling back on the elevator. This causes rolling throughout the turn. The further a person progresses, and the more precisely they wish to fly (when pattern flying for example), the more important it is that they be able to fly with their fingers. It is very difficult to switch to flying with fingers once you have learned to fly with your thumbs.

How do you handle the left/right problem?

Beginners have a common problem when it comes to mastering turning. After entering a turn, they tend to forget which way they are turning and give the wrong aileron to exit the turn (sending the plane deeper into the turn). There are several ways you can help the beginner with this problem, but the best we have found is to encourage them to 'prop up the low wing with the stick' when the aircraft is heading toward them.

What throttle setting do you use?

Try to keep the throttle setting just high enough to keep the plane in the air. This ensures smooth docile performance and minimises the beginner's natural tendency to over control. It also helps them make level turns. This concept should be introduced to the novice as the 'cruising speed' and will typically be just less than half throttle. You should be aware though that for some people, a responsiveness aeroplane is easier to master than a docile one. Either way, keep in mind that you will eventually need to have the beginner practice at all throttle settings from idle through to full power.

How much control surface movement do you want?

Instructors tend to disagree on this point. Since beginners have a natural tendency to over control, many instructors like to set up trainers to be very docile utilising minimum control surface movements. This means the beginner must move the sticks quite a bit to cause a reaction from the plane. There are however a number of factors which you should take into account. First, the beginner must eventually learn the precise control motions needed with sensitive control surfaces (more typically on their second model). Second, on windy days minimal control may not be enough to cause any response from the aeroplane in certain attitudes. Third, as the instructor, you need the plane to be responsive enough to get out of precarious attitudes, and also to enable you to fly it adequately at lower airspeeds such as experienced whilst landing. It is often best to achieve the desired results from programming of the transmitter's dual rate functions.

When do you teach rudder co-ordinated turns?

Generally, newcomers are taught to fly the basics without them ever having them touch the rudder stick (except for steering on the ground). Most RC models, and especially trainers, turn quite nicely with only a combination of aileron and elevator. Admittedly, rudder co-ordinated turns make for nicer looking turns, and rudder is helpful when landing in a crosswind, but you should try to keep turning as simple as possible for beginners until they master the basics. There is a section on the flight log that requires the novice to fly turns using only rudder and elevator on opposite sticks, and you might take this opportunity to introduce them to co-ordinating turns.

Final approach, one turn or two?

If teaching realistic flying, the RC pilot will make two turns during the final approach. One turn will bring them ninety degrees to the runway and the other will bring them right on the middle of the runway. However, to simplify this in the early stages, it is better to have your beginner making one (180 degree) sweeping turn during their final approach. Of course this is not always possible when teaching 'deadstick' landings.

What is the wind limitation?

Most beginners can learn more easily on calm days, but living in England, if we waited for perfectly calm days, we'd never fly!

There does however come a point when the wind is blowing so hard that it will be impossible for the beginner to control the plane. You will have to use your own judgement on this matter and bear in mind the control response of a model and the emergency reactions of the novice. You may find however that in some stronger winds the model becomes difficult to handle on or near the ground. You should seriously consider not flying on these occasions.

What about Aerobatics?

To relieve the boredom of circuit flying, it is quite permissible to teach the novice the rudimentary aerobatic manoeuvres such as the Loop, the Roll, the Immelman Turn, the Reversal and the Stall and Recovery. This not only enhances the trainees co-ordination of the various flight controls, but allows them to put their model into, and get it out of, unusual situations that they might encounter further down the line. You should be wary however of introducing more complex manoeuvres at this stage. The Stall Turn and Spinning etc. are much better accomplished when the trainee has improved orientation skills and are not mandatory within TMFC. The aerobatics stage is included as a consolidation exercise to iron out any bad habits that have developed, and to enhance the manoeuvres learned to this point. It is the assumption of this paper that any person instructing within TMFC will have good knowledge of these manoeuvres and an explanation of how they should be flown is not necessary here.

Narrating the flight.

The single most difficult thing that new instructors struggle with is the narration of the flight, or talking whilst instructing. You should not be afraid to talk to the student while they fly, though you must be careful to stick to the point so as not to get them confused. Here is an example conversation (though very one-sided) that you may have with a student on their first few attempts at turning. It truly typifies the kind of talking you will be doing to your own students.

"OK. I want you to enter a nice gentle left hand turn. Set the wings on the angle of bank you need and be ready to bring in up elevator. You'll see the left wingtip drop. That's it. Not to much now or you'll have to give some right. That's it. Compensate for the drop by using up elevator. That's enough. You waited just a little too long to bring in the up. Do you see the nose dropping? Put a bit more on. That's it, just keep it there. OK get ready to come out. Remember, move the stick to prop up the low wing. OK. Begin to straighten. Not too much now or you'll over-control. Good. Now let's try a turn to the right....."

Be careful with how much talking you do. Stick to the main points. In this case, bank with aileron, hold the turn with up, and straighten with opposite aileron. You'll quickly find that there is a tendency to say too much, but it does become easier with practice.

One more point about talking to students as they fly. While it's good to talk to help them get comfortable with a new flying technique, you'll want to be sure that the student is not just mimicking your instructions and confirm that the student truly understands the manoeuvre you are teaching. Once they are following your instructions and turning quite well, keep quiet for a while and just watch them fly. If they continue to do well, they truly understand the manoeuvre you have been teaching.

The De-Brief.

After each flight, be sure to review it with the student. Stress those areas where progress has been made and be sure to offer praise. You will have the student's full attention and can now offer advice and constructive criticisms. Analyse areas of the flight that went wrong, and if necessary take the student up again immediately.

TEACHING THE VARIOUS FLIGHT STAGES.

In this section we look at the methods of teaching the various stages of the training scheme and the problems and pit falls generally associated with them.

Stage 1- Pit Safety.

As part of the Wings scheme, the club runs beginner Pit Safety and Procedure training courses when demand dictates. However it is very unlikely that you will be able to wait for one of these to come around before any flying takes place, and you will have to teach the novice the most basic principals of pit safety. This should include the frequency control system, how to handle and start the model, how to carry the model, and the principal of the lean check. You must assume that novices coming into R/C aeromodelling these days have never had experience of model aircraft before, and therefore know nothing at all.

The emphasis should at all times remain on safety, and you should make the novice aware of, and if appropriate undertake, the transmitter frequency check and noise checks that are mandatory in the club.

This stage also includes your initial safety check of the model and its airworthiness. You should encourage the novice to participate and to carry out any amendments required themselves. It is unlikely though, that they will have the necessary tools and equipment with them and you may find yourself lending yours. It may also be necessary to run in the engine but you should only undertake this task if you know exactly how it should be done, and only then in compliance with all the club rules.

Propellers should be balanced and the model given a thorough pre flight check before being committed to the next stage. Unsafe or faulty models and equipment are legitimate reasons for not allowing a model to fly at any time, let alone on its first visit to the field.

Stage 2 - Introduction to flight.

Before embarking on this stage you must ensure that the trainee has read and understood chapters 5 & 6 of the BMFA approved training manual 'Up and Away', and also that the model has had it's initial trimming flight with any required adjustments having been made. A copy of Up and Away for use by the Instructors is kept in the caravan for the novice to read, and it ensures an adequate briefing on the instructions that the tutor will give. The novices are provided with a copy themselves in the new starter pack, but it may be a couple of weeks before they receive this from the club.

In this flight you will demonstrate the principals of turning and throttle control. Power up to go up etc. You should also introduce the concept of cruising speed, increase the angle of bank to turn tighter, decrease to turn wider etc. You will have to ensure that your novice understands that the transmitter stick is not a switch like a computer game but a fully proportional control. You will find that they initially try to roll inverted on their first attempts at turning, and for this reason it is better to hold the sticks at the same time as the novice so that they get a feel for the small amounts of movement required.

You should use the flight to conduct left and right turns at altitude, demonstrate co-ordination of elevator, and to check if the novice has any special requirements. Do they have a disability? Do they have poor eyesight? Do they need to hold the transmitter in a certain way? This latter point is especially important for the small hands of children. Bear in mind the points made earlier about concentration level and keep these early flight times to around 10 minutes or so. You should also throughout this stage be constantly aware of an impending deadstick landing. New motors tend to run a little unreliably at first, and this should always be at the back of your mind.

These first flights are also useful for describing what factors determine the circuit of the day and also for learning the limits of the dead airspace. At no time throughout their training should you allow novices to routinely fly out of bounds, and you should express yourself as if to do so were a cardinal sin.

These early flights are often a revelation for many beginners. They suddenly find out that this game is not going to be as easy as they first thought, and this can sometimes be difficult for them to deal with. This is especially true of the older generations who have perhaps looked to R/C flying as an easy retirement pastime. The time it takes the student to master this stage varies dramatically.

Some students will do very well on their first attempt, but it usually takes longer. Regardless of how long it takes, your students should not get the feeling that they are in a race to progress through the scheme. Some do genuinely feel that they should master flying their very first time out. When they don't, or whenever they think they're not progressing fast enough, they tend to get down on themselves. This is especially true if another beginner seems to be progressing quicker.

Part of your responsibility is to keep them from getting discouraged. Make it clear that everyone picks up the hobby at a different pace. Relate the problems you had when you learned to fly. Be sure they're having fun, because if it's fun, who cares how long it takes? Tell them if they push too hard, the problems they're having will only get worse.

Stage 3 - Trimming / Basic Circuits / Figure eight's.

If the student has truly mastered the second stage in the scheme, they should find this one relatively easy. You should now begin to stress how important it is to come out of the turn in a predictable direction with the introduction of the trainee to the basic circuits.

This means that the student must be able to exit each turn in a predictable manner, and must be able to keep the plane flying in the headed direction (without wandering) for as long a period as required. You should be aware though that at this stage the beginner will still be reacting to the aeroplane instead of making the aeroplane react to his stick movements.

You should endeavour to explain that the key to setting precise headings is knowing when to begin exiting the turn with the opposite aileron. The smoother and more gradual the turn the easier this will be. At what point opposite aileron must be applied depends on the severity of the turn and you should have demonstrated this in stage 2. As mentioned earlier, beginners tend to turn much too severely, and this makes it very difficult to exit their turns precisely.

The basic circuits include left and right handed racetrack circuits and also the basic rectangular circuits required in the BMFA 'A' certificate tests. These should initially be taught at a comfortable height but the turns initiated not too far away from the novice. Orientation will become the main issue, alongside often dramatic reductions in height as the novice under-utilises the elevator. There may also be a tendency for the trainee to roll over throughout the turn when they forget to neutralise the aileron, or indeed wrong stick the model on the exit to the turns. You should note that it can often take a novice quite some time to master the basic circuits unaided.

When you feel that they are ready and can turn equally well both left and right handed, you should introduce the novice to the principals of flying figure eight circuits. These should always be taught with the crossover point in front of the pilot in a direction heading away from the flightline. You should also aim to keep the height constant and the eight an equal distance on both sides of the pilot. This manoeuvre, when flown in a wind, is one of the most difficult for novices to master satisfactorily. A constantly varying angle of bank is required if the key points are to be hit. You may like to use the analogy of sailing a boat on a fast flowing river being similar to controlling a model on the upwind and downwind legs.

The initial figure 8's should be taught as a 'lazy' diagonal between the rectangular corners of the circuit and slowly progressed to 'two circles' as the ability of the trainee increases.

It is important too that at this point in the training you should force the student to think about trim settings. If they have pretty much mastered the ability to keep the plane in the air when it is perfectly trimmed, you should give them some practice with an out of trim model.

If you take control and throw the aileron or elevator trim slightly off, then the beginner will be forced to determine what is wrong and correct the trim problem. This is an area sometimes overlooked, but nevertheless it is a very important one. You will quickly find that the trainee cannot feel for the trim levers without looking away from his model. This of course is unacceptable, and the trainee should be encouraged to practice finding the positions of these and the other switches, 'blindly' whilst at home. You should take care to inform them that the trim operates in the same direction as the stick, as this is not often realised.

Stage 4 - Circuit transition.

At this stage it is possible for the trainee to undergo a simple exercise to teach them the rudiments of swapping circuits without either height gain or height loss. To do this we teach beginners to swap circuits at the first available opportunity using either a half figure 8 circuit or a procedure turn.

During the exercise, racetrack circuits should be flown in both directions and transition between them should be on the command of the instructor. You will of course first have to teach the procedure turn, and this should always be taught with the straight portion along the runway. Eventually the novice will learn to swap between circuits at the first opportunity without giving it much thought. They will also learn to do this smoothly and consistently whilst flying at a constant height. It is essential though that

before this stage progresses, a good ground-school briefing is undertaken to ensure that no confusion exists in the air.

Stage 5 - Climbing, diving and Stalling.

Any model with a reasonably high camber wing will gain height or lose height dependant on the throttle setting. This stage should be taught with the trainee flying the basic circuit of the day. At first one full circuit should be allowed to double height whilst staying in the circuit, followed by one full circuit to halve their height whilst staying in the circuit.

When mastered, this should be reduced to half a circuit to double the height and half a circuit to return to the original altitude. The purpose of this exercise is to prepare the novice for take off and landing .

There is however one more crucial area of the flight envelope that they need to explore before learning how to take off and land, and this is the area up to and including the stall.

The novice must learn how the plane responds at slower speeds and to do this we can use the following exercise.

With the plane rather high, have them reduce the throttle to just above idle and fly the standard circuit of the day. Have them take note of how the ailerons respond more sluggishly and also have them note how, at idle, it is impossible to keep the plane from losing altitude (especially in the turns). Most importantly, have them note how if they try to maintain altitude by pulling back further with up elevator, the plane will eventually stall.

As they continue to lose altitude in their circuit they will eventually have to increase the throttle to regain altitude. Have them repeat this several times. Be sure they can still maintain control even at slow speeds and be sure they know at what point the plane will stall. Also it is imperative that they learn how to recognise the point of stalling and what is happening throughout it. Fortunately, most trainers are very stable in a stall and no radical controls will be required to recover. (though you may wish to explain that more aerobatic aeroplanes may not be so forgiving when they stall).

Stage 6 - Taxiing.

Taxiing, especially without the wings attached, is a good means of offering the trainee time to utilise the throttle and rudder sticks without major connotations. When the novice can track the model at reasonable speed in a straight line down the strip, and has successfully completed stages 1 through 5, he should be reasonably capable of achieving take off.

In preparation for this stage it is imperative to check the ground tracking of the model.

Experienced pilots can taxi and take off even if the plane is not perfectly tracking on the ground. In fact, if the model has had a hard landing or two during training, it is likely that the planes ground tracking has not been checked for the sake of saving some time. Up to this point you may have simply held in some corrective rudder to keep the model straight on the taxi run. However, beginners will not be able to handle a plane on the ground that does not track straight from the start. This exercise is one that a beginner can easily check and rectify alone. They can even do this at home by letting the plane role down a shallow incline, with the radio on of course. Be sure to tell the beginner not to adjust for tracking with the rudder's trim (this will, of course, affect flight trim). Adjustments must be made mechanically, within the aeroplane, on either the noseleg/tailwheel and main gear. You should remember of course that it is imperative for the main wheels to slightly track inwards towards the nose.

Taxiing and making the takeoff run can be quite difficult to master. Depending upon the number of people wishing to fly at the time, practice taxiing may be frowned upon. This means the beginner may have to practice at odd hours, early in the session or towards the end of it when there is no one else around. Fortunately, once you give the beginner a few pointers, they should be able to practice ground taxiing by themselves. You will still need to give them a few pointers though, such as holding in a little up elevator or some guidance on use of the throttle control. Be sure to explain the plane's natural tendency to accelerate quickly as soon as it begins moving. Many beginners (on our grass field) who slowly increase the throttle to the point where the plane begins moving, don't realise the plane will continue accelerating until the throttle is reduced. You should teach them to quickly move the throttle to about half way and back to idle in short quick bursts. This way they can get the plane moving slowly and stop any time it starts to get a little fast.

As they develop a feel for what it takes to get the plane moving, they will make it move smoother. But first and foremost, be sure they keep the model moving slowly. As for steering, it may take quite a bit of practice, since it must be done with the left hand. Also, the same left/right problem they had in the air when the plane is coming toward them may recur.

Once they can handle the plane well on the ground, have them practice some high speed takeoff runs (still without the wings on). As soon as the plane builds up speed, have them cut the throttle. Force them to see how little rudder it takes to make the plane respond at high ground speeds. Beginners have a tendency to over-control with rudder their first few times, and this is a relatively easy lesson for them to master.

Stage 7 - Take off, climb out and manoeuvre.

By this point, the beginner should be quite comfortable with handling the plane on the ground. But you'll still want to make it as easy as possible for their first few takeoffs. Explain that taking off is just a matter of building up flying speed while heading into the wind, and that once flying speed is reached it is a simple task to get the model to leave the ground.

You should be aware that the novice is very nervous at this time, and that take off is viewed as a major milestone in their training. A very good and thorough briefing is essential and you should not only cover what you expect to see, but also cover what should be done in emergency scenarios. e.g. deadstick on climb-out, or a veering taxi towards the pilot box.

It is best to teach take off practice when the field is quiet, with slight wind, straight down the strip. At Kay House Farm the connotations of a poor take off have less impact on the cross wind runway than the main. You may also consider leaving this exercise till late on Sunday so that if the novices model is damaged, there is more time to effect a repair throughout the following week. A model extensively damaged on Saturday will rarely be repaired for flight on Sunday without assistance.

Take off should be taught with a well trimmed model that the novice has flown previously in the day. The first part of the take off is a progression from stage 6, and sometimes it is better to hold the model under full power for a fast start down the strip. This however depends on the novice and the conditions of the day. This method has things happening very quickly with some models, and sometimes close to the pilot which is often undesirable.

You should educate the novice in all aspects of the pre flight checks. Especially the areas of concern relating to persons on the pathways or other models in the circuit.

They will have learned the rudiments of the throttle and rudder control during taxi practice, but you may need to remind them to hold in a little up elevator.

At the point of lift off, they should initiate no turn. Climb-out should be held at around 15 to 30 degrees. Straight flight should be maintained until the model is a least 100 feet high where the climbing turn from stage 5 can be initiated.

It is sometimes best to break down the take off sequence into key parts, and regain control of the model from the novice after the initial climb-out. Do not make the novice walk to the pilots box on their first attempt. It is better to let them progress up to the point where they can take off and fly a circuit at cruising speed before they begin to walk. Take-off's should be performed repeatedly on the same tank of fuel, with the instructor performing all landings.

It is not uncommon for the novice to experience problems in three main areas. Firstly, they have problems holding the plane on the proper heading with the rudder while the plane is on the ground. This can be very dangerous if the plane wanders off in the direction of the pilot box and you should be sure to let them know that just because they started the takeoff roll, does not mean they have to go through with a take off. If anything looks wrong or they feel panic for any reason, have them cut the throttle!

Secondly, when taking off in winds over about 5 mph and especially with a cross wind, beginners have trouble holding the wingtips level after the plane lifts off. Since the plane is not moving very fast at this point, it may respond rather sluggishly. The beginner must be ready with firm, accurate aileron control. When taking off in any kind of cross wind, be sure to make them predict which way the wind will tend to blow the plane as it lifts off the ground. This way, they will be ready to apply the opposite aileron.

Thirdly, beginners tend to apply too much up elevator to get the plane off the ground. Or they hold the elevator in too long. Either way, the plane will have the tendency to stall soon after lift-off, or at the very least climb too steeply and drop a wing.

Many beginners will think they have mastered takeoffs with their first successful one, regardless of how scary it was. However, you must stress that each takeoff will be different, and it will take many takeoffs to become fully proficient. Wind direction, wind speed, and rudder sensitivity will make for a few nerve-wracking moments. Remember, as soon as the beginner has successfully taken off, retake control, land the plane, and make them do it again - and again - and again. If all practice is done on a

nice calm day, be sure that they are aware that they may not be allowed to do this in windier conditions just yet.

Stage 8- Landing approaches and overshoots.

This step requires a great deal of throttle usage and before starting this stage, it would be wise to confirm that your student's engine will maintain idle, go from idle to full, and in general, perform without stopping or stuttering at all throttle settings.

Earlier in their training the novices have learned to fly quite accurate circuits at varying heights. Now we have to get them to repeat this practice, but this time have them reduce the throttle and fly the model down the middle of the runway, before overshooting on your command and flying back up to a safe altitude. It is imperative that when you call overshoot, that they increase power to full throttle and climb out as if they had just taken off. Nothing else is acceptable and many incidents have been caused by the student trying to climb out with insufficient airspeed.

It is important that during these practice approaches, the beginner gradually lets the model come closer to the ground. The final approach turn is a very important key point to hit, and becomes more difficult to master correctly as the circuit is flown lower and lower.

Although your novice may find the concept confusing and un-natural at first, they must understand that the nose of the plane must maintain a slightly downward attitude throughout the turn and final approach. This is of course how we cause the plane to maintain airspeed as it comes towards the ground. The windier it is, the more important this point (and the more severe the downward attitude).

If you find that your novice is having to add power to reach the strip, and hence the overshoot point, you should alter one of the three landing variables. These are of course:

***Height,
Distance,
Speed.***

These points are much better covered in a full briefing before your flight takes place, along with some instruction on the finer points of landing from the next stage just in case you get the 'perfect' approach.

More often than not, excessive practice in this area will ensure that the novice does not 'lose it' when they finally come to purposefully land their model. Remember that approaches and overshoots should also be taught on all circuits and in all wind directions and strengths. Even seasoned pilots drop shy of the strip from time to time in high winds. Especially if the model is not their own, or they have never flown it before. Some novices can take consolation from this as they begin to understand the penetrative qualities of various models.

Stage 9 - Landings.

If all stages to this point have been truly mastered, landing will simply be an extension of what the student already knows. However, if they are having problems with this stage, it should be taken as a signal that further practice at stage 8, is needed.

Once the student has progressed to the point where they can consistently align the plane with the runway and bring the plane to within ten to twenty feet from the ground, they are finally ready to land. Once again, remember that beginners tend to rush this. You must determine when they're ready. If anything, a little more overshoot practice than necessary won't hurt.

A beginner's first few landings tend to be a little rough. Though the correct amount of approach practice should help them overcome nervousness. Beginners tend to panic when low to the ground, and you should be aware that they do forget which way to turn, especially if minor aileron corrections are necessary, and also have a tendency to 'freeze' on the sticks whilst their model plummets to the ground. It is essential that they fully understand the functions of the throttle and the elevator and how they compliment each other during the landing phase.

Before letting them land, explain that landing is really nothing more than letting the aeroplane drift to the ground. Explain that if they do it right, they will not be having to force down elevator into the approach to get the plane to come down, moreover they will find that at the point of a perfect

touchdown, they will probably be holding in full up elevator. You can easily demonstrate this to them by letting them watch your hands on the sticks whilst you do a few landings. You can tell them that their model will do this 'slowing and sinking' naturally because of the low throttle setting.

During the last twenty to thirty feet of descent, the beginner must be charged with keeping the wings nice and level. As when taking off, they have to be ready with sharp, precise corrections to keep the plane on the centre of the runway. When the plane drifts down to within about 1-2 feet above the ground, explain that they should gently pull back on the up elevator to cause the plane to flare out in an attempt to keep it flying at 'a foot off the deck' at all costs.

It is likely that at some point during training that you had a few dead sticks. The beginner got to see how you handle them, but they should also practice them, since sooner or later we all have to land without power. One obvious way to practice is to simply cut the throttle and pretend the engine is no longer running (as in the BMFA 'A' test). At first, have the plane in a nice, high, upwind position so the beginner can juggle the landing variables in relative comfort. As you continue practising, get the plane into more precarious conditions (downwind, or low down straight from take off) when you cut the throttle. Even if you just have the beginner tell you what they would do if the engine cuts in a given position may be good enough. In any case, be sure the beginner is prepared.

Though a beginner's first solo landing is a great confidence builder, do not let the beginner think they have mastered it just because they have managed to pull off one greaser. Tell them that as with taking off, every landing will be different and just because they were allowed to do it today doesn't mean that they will be allowed to do it tomorrow. While the beginner will be very anxious to begin flying by themselves at this point, be sure they have practised landings over and over again - in all directions and wind conditions.

You should also be aware that this is a major turning point for many novices, and they do have occasion to 'forget' that they are still learning. They will be very anxious to get in as many flights as they can throughout the day and sometimes their anxiousness to go it alone can cause friction and they will leave the club. The sensible ones however will realise that there is still much to learn, and will progress onto the next stage.

Stage 10 - Solo Flight.

This stage should only be undertaken when the novice has mastered the art of taking off and landing and has demonstrated good 'airmanship' and good emergency reactions. You should not turn your back on a nervous beginner to have him demonstrate his first solo flight without satisfying yourself that he can safely do it to an acceptable level.

It is often better, when you have decided that your novice can go solo, to firstly not tell them that they are about to do it, and secondly to lull them into a belief that it will be another training flight by having them take off and enter the circuit whilst you just do a little job in the pits or something. You will of course then join them, but remain silent without giving instruction **at all**. The novice will have to make the flight all by themselves. You may wish to stand back a little whilst this flight takes place but this does border on a breach of club rules. Technically the novice will be flying without your direct supervision and without the required BMFA 'A' certification. This however is a necessary step, but you should never be so far away that you cannot intervene. It is often sufficient to stand quietly some 6 to 10 feet behind the novice and remain silent without narration or verbal encouragement.

You should never leave them completely alone at this stage.

If they start to get concerned that you are not "instructing", you should tell them that you are not going too, and stand back to watch intently as your trainee achieves this major milestone. Should anything un-toward happen you should observe how the situation is handled by the novice and only intervene if you really do need too. If the pupil is obviously struggling without your moral support, he is not ready to go solo.

Should the flight be successful however, you should be ready to demonstrate adequate praise.

Stage 11 - Aerobatics.

Throughout their training up to this point you will have been teaching your novice the rudiments of basic aerobatic manoeuvres. These will typically have been Looping, Rolling, Immelman turns, Reversals and the Stall & Recovery. You should now seek to enhance these patterns to improve line, entry and exit heights and throttle control to an acceptable level. Watch for the correct entry attitudes and airspeeds and introduce the concept of minor corrections throughout the manoeuvre.

The flights in this consolidation period should be made with the standard circuits and the manoeuvres thrown in ad'hoc and occasionally, consecutively as would be required throughout the end flight test. It is the assumption of this paper that any person instructing within TMFC will have good knowledge of these manoeuvres and an explanation of how they should be flown is not necessary.

Stage 12 - BMFA 'A' Certificate.

The novice will be entered for the BMFA 'A' certificate on application to one of the registered club Examiners. In preparation for this stage you should rehearse the test with the novice making full use of the available BMFA document 'Notes for guidance to Examiners and Candidates' for the fixed wing 'A' test. The novice will also be expected to show a good working knowledge of the BMFA Safety Codes and local club rules. You will have been addressing these issues when conducting your debriefing sessions with your novice whilst completing his flight training log book.

Stage 13 - +Twenty Flights (Indirect Supervision flying.)

In 2015 an EGM of the club changed the criteria required for pilots to fly with no instructor supervision. Pilots holding the BMFA A Certificate for their class of aircraft are required to undergo a short period of assessment beyond this qualification in order to demonstrate consistency during the flight of diverse model types. The candidate is required to log at least twenty flights under the indirect supervision of a club instructor. The flights should be flown to BMFA 'A' Certificate standard and contain various elements learnt on the scheme, including basic aerobatics. The flights **MUST** be incident free (no crashes, missed runways, breaches of dead airspace etc.) and at least two different models must be used. Use of Electronic stabilisation is not permitted throughout this period.

Stage 14 – Instructor Sign Off.

On completion of the required number of flights, a majority decision of the club instructors is required to complete the clubs training and gain clearance to fly with no instructor supervision. The instructors will be looking for consistency in the candidates flight safety and ability and demonstrable compliance and knowledge of club rules. If a candidates flying or safety is inconsistent, further flights may be required or further instruction may be given.

In their consideration of a novices flight certification the Instructors should pay particular attention to areas such as the trimming of the model, variance of flight (i.e. not just endless circuit after circuit) and deadstick landings, as these tend to get relaxed to a standard that is quickly unacceptable. This period of assessment is the culmination of everything that the novice has learned to date and is an opportunity for the novice to demonstrate that he can fly the model safely and handle it towards the edges of its performance envelope.

When the instructors are in agreement the novice will be cleared to fly and badges and certificates will be presented at the club meetings.

Appendix 1 - Training record.

NAME.....

Flight Stage	Passed By : (Instructors Signature)	Seconded By : (Instructors Signature)	Date
Stage 1 Pit Safety.			
Stage 2 Introduction to Flight			
Stage 3 Trimming / Basic Circuits / Figure 8's			
Stage 4 Circuit Transition			
Stage 5 Climbing, Diving and Stalling.			
Stage 6 Taxiing.			
Stage 7 Take off, climb out and manoeuvre.			
Stage 8 Landing approaches and overshoots.			
Stage 9 Powered and Deadstick landings.			
Stage 10 Solo Flight			
Stage 11 Aerobatics.			
Stage 12 BMFA 'A' Certificate			
Stage 13 +Twenty Flights			
Stage 14 Instructor Sign Off			