

A Short Guide - Learning To Fly Fixed Wing Radio Control Aircraft

"What goes up must come down; it's only a question of how soon and how hard. Learning to fly under instruction will make the process easier, cheaper, and more likely to succeed."

This is a short guide about learning to fly fixed wing aircraft. Learners are also advised to read the BMFA guide "Up, Up and Away" which covers the same topic in more detail, the "BMFA handbook" which gives safety guidance plus information about the 'A' test that learners generally need to go solo, and the BMFA examiners guidance for the 'A' test, all of which are downloadable from www.bmfa.org.uk.

How Do I Start

There are several options for the person about to take up radio control flying

1. **Go it alone ... or if at first you don't succeed try, try and try again:** The problem with this approach is that it can be very expensive and there is a danger that you can injure yourself or someone else or their property. Most people using this method will crash on their first attempts and either give up or spend a lot of time and/or money between flights repairing their aircraft, or just give up.
2. **Join a club and learn to fly with a club instructor:** Long term this is the best method as not only will you learn to fly safely but you will be less likely to suffer a crash while learning especially if you are using a 'buddy box' (dual control) setup. As a member of a club you also then have access to a flying site.

You will normally need to team up with an instructor and agree times when he/she can teach you, but remember they are also paying club members and will want some of their own flying time as well.

3. **Pay for private lessons:** This can be an expensive option but there are a number of model flying schools around. You may find this a useful way to get an intensive day of learning when preparing for a test or when moving on to a new specialism such as from fixed wing to helicopters. Contact details for private schools can usually be found in the hobby magazines such as RCME or in our web page links section.
4. **Computer Simulation:** Whichever method you chose you can also fly on your computer, if you have one. No matter how good you are it is well worth buying a dedicated model flying simulator, available at most model shops.

Make sure that you can either attach you own transmitter to the computer using the special lead or adaptor supplied by the software company, or alternatively buy a simulator with a supplied dummy transmitter. There is a downloadable freeware flight simulator called "FMS" which is good but you will still have to find and pay for an adapter cable.

Remember, no matter how good the simulator there is always a difference when transitioning to the 'real' thing but most RC flyers will use a simulator to practice maneuvers, hone their skills, improve reaction times and hand eye co-ordination ... especially in bad weather when unable to fly outside. Using a simulator will give the learner more hands-on time allowing them to pick up the necessary skills to go solo much quicker.

Equipment

1. **The Buddy Box:** Modern transmitters of the same make can usually be connected together using a special cable to provide a buddy box system. With this system both the Instructor and the Trainee each have their own transmitter but the Instructor has full

control of the aircraft until he/she operates the trainer switch, passing either all or some control over to the trainee. If the Instructor sees the trainee getting into trouble then they can simply turn off or release the trainer switch and recover the aircraft, returning control to the trainee as soon as safe. This is much better than the old method of passing the transmitter between the instructor and the trainee which can lead to accidents.

2. **The plane, radio system and other equipment:** Please see our other guides which cover this topic.

Transmitter Control Layout

Mode 2: The standard transmitter has two joysticks, one for the left hand and the other for the right hand. What each stick does is dependant on the 'mode' of the transmitter ... worth checking when purchasing your radio to avoid a nasty surprise. Most RC Flyers now use what is known as 'Mode 2' and most transmitters are supplied preset to this mode. In Mode 2 the four main channels (1 to 4, which typically relate to the aileron, elevator, throttle and rudder) are set up on two control sticks (joysticks), one for the left hand and the other for the right hand.

In mode 2, moving the left stick from bottom to top increases the throttle/engine speed; whilst moving it from left to right controls the aircraft rudder which in turn controls the yaw axis (rotation of the aircraft to left or right) in flight and also usually controls the steerable undercarriage whilst on the ground. Similarly, moving the right stick up and down controls the elevator to pitch the aircraft up or down; whilst moving it from left to right controls the ailerons to bank the aircraft to turn to the left or right.

Note that the throttle is not sprung loaded and does not return to the centre when the left stick is released, allowing you to adjust the desired engine speed without holding it against a spring.

Increasing the throttle, by moving the left stick upwards, and then pitching the aircraft up by moving the right stick downwards will cause the aircraft to climb once it has built up sufficient airspeed. A well set up trainer aircraft will usually fly straight and level with all sticks in the centre position, although wind conditions will affect this.

Safety

Your instructor will brief you about the safe procedures for checking and starting your model. Remember that you will need to have the equipment to fuel and start your engine, plus the means to restrain it in place once it is running. Always charge your batteries within a day or two before flying.

Your instructor will also show you how to tune your glow engine so that it is not running lean, which will cause engine damage, or too rich which results in loss of top speed and power. Slightly rich is safest.

Manoeuvres

1. **Rectangular Circuit:** This is the first manoeuvre to learn when flying ... the Instructor will usually be taking off for you at this stage. This is the basic circuit that all club flyers will follow, especially when there are lots of models in the air. The key to this is learning to fly the straight sections in level flight at approximately the same height and at right angles to each other. To achieve this you also need to be able to make 90 degree turns without gaining or losing height. Try to make every circuit look the same rather than doing different sized rectangles at different heights each time. This shows the instructor that you are flying the plane and that it is not flying you!

To fly straight and level, the throttle stick should be near to the centre position (i.e. at cruise speed) and the elevator trimmed for level flight, you should then only need to make small control inputs to keep the aircraft on track, although the wind has the habit of interfering! Your instructor will teach you how to trim the aircraft to fly straight and level using the trim controls on the transmitter, and give you practice in this important skill.

To turn the corners the aircraft needs to be banked, using the ailerons, to no more than 30-40 degrees off of level flight. The elevator is then applied to increase the rate of turn and to compensate for sudden changes of height. Exceeding this bank angle when learning to fly will indicate poor control and is more likely to result in loss of height or an unwanted roll or crash. Full size pilots will also increase throttle when turning to prevent height loss and use rudder to prevent the aircraft side slipping, and it is worth experimenting with these additional controls once you gain confidence and dexterity.

2. **Take off:** Once you have mastered the rectangular circuit you should be ready to attempt your first take-off.

There are two stages to the take off, the first 'hurtling' down the runway to build up sufficient air speed and the second performing a controlled take off with a gentle but positive climb to cruising altitude. Remember to take off and land into the wind to reduce ground speed.

The first phase requires full throttle to accelerate plus use of the rudder to keep the plane running down the centre line of the runway. Note that whilst the plane is on the ground the ailerons cannot be used to turn the aircraft which is why you need to use the rudder. With a trainer aircraft fitted with a nose wheel you should not need the elevator at this stage. However as you move onto a tail wheel aircraft you will initially need to hold the tail down by applying up elevator (stick down) then, once the plane is moving at speed, release the pressure on the elevator (to prevent too early a take-off) and allow the tail wheel to lift whilst keeping the front wheels running along the ground, and then once you reach take-off speed pull back gently on the elevator for a controlled and scale like take off ... simple?

3. **Landing:** there are three main phases involved in landing and these are the landing circuit, the final approach (in which you have to control both the line onto the runway and the rate of descent), and the flare out just before touch down.
 - a) **The landing circuit** ... This is simply a rectangular circuit that starts as the aircraft crosses in front of the pilot travelling up wind and completes as the aircraft enters the final approach from downwind. The aim of this circuit is to position the plane in the sky at the same point, orientation, and speed for every landing. A tall order but if you can achieve this then the final landing approach always starts with the same set of parameters and your learning process will be much quicker.

As you become more experienced you can extend or shorten the landing circuit and vary the height but for now, whilst you are learning, try to make every landing circuit and final approach the same. On completion of the landing circuit the aircraft should be lined up with the airfield at the required height and distance for the landing.

- b) **The final approach** ... The RC flyer does not have the benefit of the instrumentation that real pilots have in monitoring their landing speed to prevent the aircraft from stalling and many aircraft will simply fall out of the sky if flown too slow. When landing this results in often results in unwanted contact with the ground. One accident investigator jokingly referred to a crash as "they had a problem with the air-to-land

interface”.

“When landing the throttle is used to control the angle of descent (the glide angle) whilst the elevator is used to slow the plane down”

It takes a while to get your head around this but if you remember this from day one then you will be a better flyer. Too often an experienced RC flyer has realised their aircraft is landing short of the runway and pulled back on the elevator to try to stretch out the glide. As a result the plane slows down too much, tip stalls (one wing drops suddenly), and the plane smashes to the ground. Better to have increased the throttle to reduce the glide angle. Keeping the nose pointed slightly downwards until the flare out on the landing approach is also a good way of preventing an unwanted stall on landing ... as pulling back on the elevator to stretch the glide will cause the aircraft to nose up.

Inevitably reliable landings come from practice and more practice. Real pilots practice touch and go's as part of their training and this is also essential for learner RC flyer.

If things do not look right on the approach then simply fly around and try again.

- c) **The flare out:** Done correctly the flare out brings the aircraft in gentle contact with the ground for the perfect landing. As the aircraft crosses the runway threshold (the start of the strip) the throttle is reduced to idle and the angle of glide is maintained. When the aircraft is about 30-50cm above the ground pull back gently on the elevator so that the speed and angle of descent is reduced to allow a gentle contact with the ground. In the perfect landing the airspeed falls to the point where the aircraft stalls (loses lift) just as the wheels touch the ground. If the aircraft climbs or rears up during the flare out then there is a risk that airspeed will fall too rapidly and the plane will drop out of the sky, usually as one wing stalls and drops suddenly, which is referred to as a (wing) tip stall. The cartwheel that normally results from a tip stall can do a lot of damage to the aircraft so be ready to open up the throttle and go around for another try (an overshoot). If the aircraft rears up then carefully but quickly push the elevator forwards to bring the aircraft in to land.

This completes this guide but to complete your A test you will need to learn the figure eight, dead stick landings and general safety. Further details of which can be found in the BMFA guide up, up and away.

As you advance remember to experiment with the rudder in flight so that you are using all of the controls, remember the correct use of elevator and throttle when landing.

Warning - As you move on from being a learner you will also gain experience in repairing as you push your ability! Once you have passed your 'A' test you should use your instructor to learn basic aerobatic manoeuvres.

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