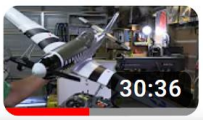
Radio Controlled Flight Training Programme

Overview

Objectives:

Check out our flight training video. Click on image below:



Learn to Fly RC Planes

RC Jim

- Understand what needs to be done.
    - Principles of flight
    - How to setup transmitter – very basics
    - Safe setup
    - Taxiing
    - Takeoff
    - Normal flight
    - Landing
    - Aerobatics

  These matters are learned in ground school, then reinforced with instructor in flight training.

- Develop a sense of pilot perspective – move controls right way at right time, more or less automatically, without a lot of thought required.
- Develop fine control movements.

Method:

- Ground training in stages
- Flight simulator
    - Built in training program.
    - Fly on own outside of training program, using a trainer aircraft.
    - Work through same set of tasks as with instructor below.
    - Change aircraft several times noting the differences in handling: takeoff, ordinary flight and landing.
- RC car driving on track utilising joystick transmitter to help develop fine ‘motor skills’ in moving the stick precisely and get accustomed to controlling from the driver’s/pilot’s perspective. Ideally, use an airplane transmitter with mode 2 throttle and steering on the right hand (aileron) stick. This step is optional.
- Flying RC plane with instructor
    - Flying after instructor gets the plane in the air, flying straight and level.
        - Easy to handle trainer, such as FMS Ranger 1800.
    - Flying the pattern.
    - Flying with S turns downwind.
    - Landing approach to about 3 m above ground, then go around.
    - Takeoff.

- Takeoff and landing. After the instructor and student are confident with this, the instructor remains available to take control for a time, but only if absolutely necessary.
- Level circle.
- Level figure eight. (No change in altitude)

- Solo
  - No 'buddy box'.
  - Practice of all the above with a focus on precision.
- RC plane with instructor
  - Stalls and recovery.
    - First, observe the characteristics of flight controls and airplane behaviour as the stall speed is approached.
    - Second, at a safe height, allow the plane to stall, then release elevator, apply power gradually and level wings to recover, then climb to regain altitude. Should the plane go into a spin, the rudder may be needed to both stop the spin and level the wings. It is receiving the 'back-wash' from the propeller, and is effective, even when the wing is stalled, whereas, the ailerons are not.
  - Use of flaps (if available)
    - Low level, slow pass with each stage of flaps.
      - Use of throttle to maintain altitude, but low speed.
    - Landing with each stage of flaps.
      - When to engage flaps
      - Throttle setting at each stage of landing
      - Managing throttle during flare and touchdown – observing airspeed relative to stall speed.
  - Dead stick landing
- Final 'flight test' and granting of wings!

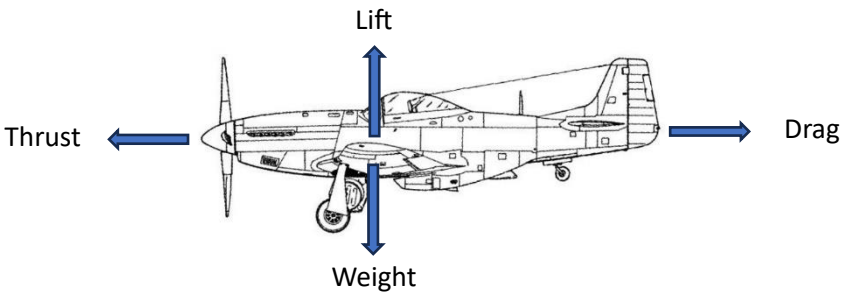
The detail

Ground training in stages

Principles of flight

What makes an airplane fly? It's actually a whole combination of things.

Consider the forces acting on an aircraft.



Thrust.

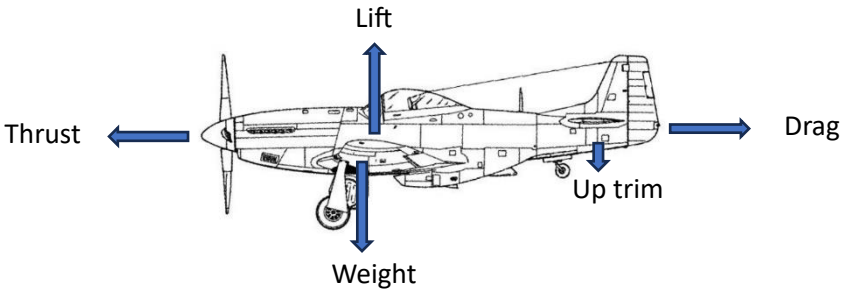
The propellor, ducted fan or turbine blows air to the back. As it does that, the blades are developing lift, but in the forward direction instead of up. And, of course, there is an equal

and opposite reaction to the mass of air and gasses being pushed backwards, with force being applied to the propellor or fan. This forward pulling force is what we call 'thrust'. And, when it is greater than any forces holding the plane back, the plane is going to accelerate forward.

How quickly that happens will depend on the weight, or mass, of the aircraft as compared to the thrust. But with a typical sport model having the zero-airspeed thrust equal to or a little greater than the airplane's weight, it can be quick!

Lift

As the plane accelerates, it builds up airspeed, and lift begins to be developed on the wing and horizontal stabiliser (horizontal aerofoil on the tail). This happens due to the curvature of the wing. Air flow going over the top of the wing travels faster than the part of the airflow going below, and that creates a lower pressure area on the top of the wing. With the air pressure underneath the wing being higher, it pushes the wing up.



Of course, the horizontal stabiliser may be pushing either up or down, depending on how the plane is balanced and trimmed. If the plane is balanced to be slightly nose heavy, as is common with a plane setup to be a bit easier to handle, then to maintain level flight, the elevator will have to be trimmed up slightly to hold the nose up. That is putting a downward force on the tail surfaces. But that should be very small, so that the tail isn't doing much of anything to add or take away from the lift.

Drag

With the plane gaining airspeed, drag is being developed, resisting the forward movement. But the motor is able to produce a lot more thrust that what the drag is at low airspeeds, so the plane continues to accelerate.

Flight

While the weight of the airplane is greater than the lift, the plane will remain on the ground. But once it is greater than the weight, the plane will take off.

In the air, the plane continues to gain speed until the drag equals the thrust. At that point in time, the lift remains constant, and if it is greater than the weight, the plane will continue to gain altitude.

Controlling altitude – angle of attack and stalls

Either the throttle or the elevator can then be used to control the altitude of the plane. The elevator will affect the lift by changing the angle of attack. By pushing forward on the elevator stick, the airspeed increases, but the angle of attack decreases. That's the angle between the relative wind and the cord of the wing – a line drawn straight from the leading

edge to the trailing edge. So, pushing the elevator stick forward will make the plane go faster, but make it lose altitude.

Naturally, pulling back on the elevator stick will increase the angle of attack and reduce airspeed. This will result in gaining altitude as long as the airplane still has enough airspeed.

That angle of attack is one of the things that changes how much lift the wing generates, along with how much drag is created. Generally, as you increase the angle of attack at any given airspeed, both lift and drag increase. That continues until the wing "stalls." A stall is when the air flowing over the wing is no longer able to follow the curvature of the wing smoothly, but breaks loose with all kinds of eddy currents forming. That kills the lift and drag increases greatly. With decreased lift, and a tendency for the centre of lift to move backwards on the wing, the nose is likely to drop, especially on a low wing aircraft. Ailerons are likely to become sluggish or totally non-operational. If the plane is turning, it's likely for one wing to stall before the other, and for the airplane to go into a spin. That's a descending spiral, nose down, where instead of flying, the plane is descending like a spinning leaf. By applying throttle and rudder in the reverse direction of the spin, you should be able to recover. If your plane has a lot of 'torque effect,' take it easy in applying the throttle – get up to something close to full throttle over a few seconds.

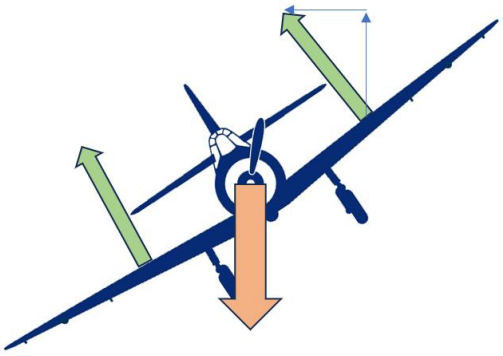
The airspeed at which a stall occurs is referred to as the planes "stall speed." It is different for each aircraft, and it will also be decreased by the use of flaps. It's a more advanced matter, but we might mention here that it is also possible to stall a plane's wings at high airspeeds. A violent manoeuvre which breaks loose the flow of the air from the surface as it goes over the wing may cause a stall at any speed. We refer to that as a "high speed stall."

The throttle is the other way to change your altitude. As the plane goes faster, more lift is generated, and that will cause it to gain altitude, other things being equal.

Of course, it's very common to use both. To ascend, increase throttle, and pull back slightly on the elevator stick. To descend, push forward on the elevator stick and decrease throttle.

Turns

Now, all of that is great as long as you want to fly straight ahead, but at some point in time you are going to need to turn. You might think that the rudder is what you would use for that – after all, that's what steers a boat! Well, it certainly is possible to steer the plane with the rudder, and when you are on the ground, the rudder along with the nosewheel or tailwheel is precisely what you would use to steer the plane. But in the air, the main control to use is the ailerons. They are control surfaces on each of the main wings. When one goes down, the other goes up, making the plane roll. (Rotate along the longitudinal axis.) As you do that, lift is increased on one side, and decreased on the other. An angle of bank is then established to take you around the turn. Once the desired angle is achieved, the ailerons are neutralised and more or less held there until the turn is complete.



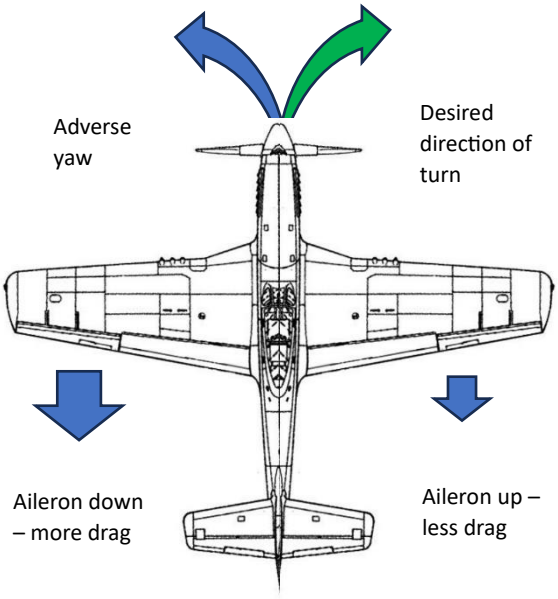
Maintaining altitude in the turn

In going around that turn, with the aircraft banking towards the turning direction, the force of the lift on the wings has been pointed somewhat toward the direction you are turning. The sideways component of that force moves the plane in that direction. And, as it does so, the tail surfaces cause the plane to move like a weathervane and point to where it is going.

But, since a portion of the lift that was needed to keep the plane at a constant altitude is now being used to move it around a turn, only a portion of the lift is there to hold the plane up. So, elevator will need to be applied to hold the plane up there. Furthermore, all those control movements, along with an increase in angle of attack due to applying more elevator, are also going to increase the drag. So, if you are flying at a low airspeed, you may need to add throttle to keep the plane from stalling.

Adverse yaw

Thinking about that caution, the problem is made worse if you are not maintaining a "coordinated turn." That is a turn in which there is no sideslip. With that sort of turn, the plane continues to fly straight into the relative wind (airflow with respect to the aircraft), which, in turn, means that the relative airflow going over each wing is equal.



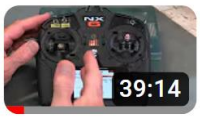
The most common threat to making a coordinated turn is what we call "adverse yaw." That happens at the beginning of a turn when you apply the ailerons. The one on the outside of the turn goes down increasing lift. That also increases drag. At the same time, the one on the inside of the turn is reducing lift, decreasing drag. Both of those try to turn the plane in the opposite direction from where you want to go. So, right at the beginning of a turn, you may see the plane point up and away from the way you want it to go. It will then do a bit of a sideslip around the corner and end up going where you want. With plenty of airspeed that isn't going to be a big issue, but it would be a concern if you were close to stall speed.

The basics

These are the basics of flight, and you will do well to keep them all in mind as we go through more detail on the other things you need to know. So, let's now get into how to get the rubber on the road!

Setting up the transmitter

You may decide to simply 'farm' this matter out to your instructor or a friend at the flying club, but you would really do well to begin learning the basics now. Along the way you are going to need to do some adjustments, and you may accidently do something wrong and need to recover, so we would encourage you to begin learning now.



Spektrum NX Transmitter Basics
RC Jim

Note that RC Jim has produced a video on setting up a Spektrum NX6 transmitter that will be an immense help to you if you are going to use a NX series transmitter. But for now, here are the very basics that you need to know for being able to fly a plane where it is already set up in the transmitter.

Controls on the transmitter box

Along the top, an NX6 has seven switches. Most have three positions, a couple of them have only two. There is also a button there. Each of those can be programmed for what you want them to do. Typical uses are:

- Throttle cut off for safety.
- Selection of mode – low rates vs. high rates etc.
- Raising and lowering landing gear, if plane so equipped.
- Position of flaps
- Triggering the binding process, connecting the transmitter to the receiver.
- Testing the range of the transmitter with reduced power.

As there are many ways that the above items can be configured, have the one who did the transmitter setup give you a briefing on what does what.

On the front you have the two large joysticks, with trim buttons for both the vertical and horizontal movements of the sticks. Between them is the power button.

Below the joysticks is the display screen with three buttons on the left and a roller button on the right. They are all used in viewing, selecting and changing various menu options. The roller is used to select items, and when you push down on it and get it to 'click', it will select the item that was highlighted.

Turning on the transmitter

For Spektrum NX transmitters, simply press down on the clear bars in the middle of the transmitter (in the form of the Spektrum logo) until they light up. Then release the button.

Selecting a plane

There are two ways to see which planes are set up in your transmitter. The easy way is to press the top two buttons together on the left side of the screen. Use the scroll wheel to move through the list, and find the plane that you are going to fly. Again, the person who set it up for you can let you know which one that is.

Setting up your plane

You will most likely need help with this, but there are steps that you need to be familiar

with, as you will go though some of them with every flight, and the rest with every plane that you add to your personal hangar.

Appropriate components

Power

This may have already been done for you by the one from whom you acquired your plane, but I have acquired several planes where this hasn't been right, so it's worth checking.

Power to weight ratio

For a typical sport flyer or trainer, the thrust should be about the same as the weight of the aircraft in flying condition, including battery or fuel. A bit extra would be beneficial.

Calibrated throttle stick

For an electric plane, the ESC may need to be calibrated. See our separate videos on ESC calibration for this procedure.

Matched components for electric powered aircraft

Electric RC Plane Component Selection
RC Jim

Introduction to ESC Programming for RC Planes
RC Jim

ESC Programming - How to Do It
RC Jim

The selection of the prop, motor, ESC and battery need to be such that they are efficient and operating within the amperage capacity of each. Keep in mind that the motor and prop combination will determine what level of current is going to be drawn with a given battery voltage. The battery and ESC then need to be rated at a level above that for safety and reliability. That will be a current rating in amps for the ESC and a C rating times the amp hour capacity for the battery. Note from our videos on batteries that the C rating is commonly overstated on high-capacity batteries.

Control direction and travel

Check that each of the control surfaces move in the correct direction when the transmitter stick is moved in the appropriate direction. Naturally, this is done after binding the plane to the transmitter, as described below, but it is mentioned here, because you will normally do this while preparing the aircraft at home. The "pre-check" items below are checks done at the field.

Refer to the instructions for your plane, and find out how far each control surface should move when the stick is moved all the way. If you don't have the instructions, search for them on the internet. Adjust the plane accordingly. That can be done by changing which hole on the servo control arm is being used, the same on the control horn on the control surface, and then further adjustments can be make with your transmitter's programming. As noted by one of our subscribers, it's a good idea to be using close to the full travel of the servo rather than having it make very small movements for full control surface deflection. This keeps loads on the servo at a minimum and provides more 'solid' control, with less control surface flutter.

With the plane safe and secured, check to make sure the prop spins in the correct direction, and that the throttle cut off works.

Double safety for electric planes

Many fliers insist that you should have a cut-off plug on the exterior of your plane. This is an additional safety measure, beyond the cutoff switch on the transmitter. Run one lead coming from the battery through a female connector on its way to the ESC. Mount that connector on the side of your fuselage, such that it is accessible when the plane is fully assembled. To function that could be either the positive (red) or negative (black) lead. Given that it's not a metal plane with the frame being grounded, I don' t see that it makes any real difference. Special mounts are available for this purpose. Then, solder a wire across the two conductors on a male connector. That is then used as a plug to short across the female connector, completing the circuit to the ESC. You don't put in that plug unless you are testing the plane in getting ready for flight, or have the plane set down at the flight line and ready to go.

Balance

It's critical that the fore-aft balance of the aircraft be where it is needed. That's going to be close to the centre of lift of the main wings. Your plane's instructions will specify what this needs to be, or you can see our video on how to work that out. Each plane should have this marked in some way so that you can check it when using different batteries or simply want to verify that it is still OK.

While you are at it, with the plane on a table, grab the spinner, make sure it is in a place where it is free to turn either way, grab the top of the tail fin and pick up the plane. It should stay level side to side. If it drops a wing, you should add weight to the end of the wing that raises up in doing this. Should it not be really bad, just take note of which way it wants to go, and be ready to trim it in flight with the ailerons.

Binding the plane to the transmitter

Most likely this has been done by the one who set up the transmitter for you. It's a simple procedure which we go through in our video on the Spektrum NX transmitter. This only needs to be done once. After that, any time that you power up your transmitter, select the plane and then power up the receiver, the transmitter and receiver will recognise each other and link up to provide control.

Pre-flight checks and tests

Airframe integrity

- Check to make sure all control surface hinges are intact.
- Verify that all components are in place, especially when the plane has been assembled at the field: wing spar(s), screws to hold wings in place, clips to secure wing struts, etc.
- Look for any loose pieces, bent control surfaces, wings angled differently, etc.
- If it's an electric plane, make sure the battery is in place, but unplugged.
- Place your fingers on the balance points, and make sure the plane hangs either level or very slightly nose down. Do this with the plane right side up for a high wing aircraft, and upside down for a low wing plane.

Radio function

- Place the aircraft on a table or restraining device to keep it from moving forward should the throttle accidently be applied.
- Verify that the throttle stick is down and the throttle cut-off switch is engaged.
- Turn on the transmitter, and select the correct aircraft.
- Power up the receiver on the aircraft.

- Move the aileron stick to the right. The right aileron should go up, and the left one go down. Move it to the left and the opposite should happen.
- Pull back on the elevator stick. The elevator should go up. Push it forward, and the elevator should go down.
- Push the rudder stick to the right, and the rudder should move to the right. The nose wheel or tail wheel should also turn to make the plane go to the right. Neutralise the rudder stick, and the rudder and tail/nose wheel should be straight. And, then test it to the left.
- Hold the aircraft to keep it from moving, disarm the throttle cut off, and apply just enough throttle to spin the propellor. Verify that it is blowing air towards the back of the plane. Flip the throttle cutoff switch back to its safe position.
- Walk about 30 large paces away from the aircraft so that you can view the control surfaces from the rear. Hold down the button on the top left of the transmitter, then work the control sticks for the aileron, rudder and elevator to verify that they are working (not the throttle!). Note that when this button is depressed with the default transmitter setup, it reduces the transmitter power. Given that it can still control the plane at that distance, it should be fine in maintaining radio control around the flying field at full power.

Techniques for basic manoeuvres

- Taxiing

  When taxiing on the grass, hold the elevator stick all the way back, use the throttle to get going and steer with the rudder stick. Sometimes a quick jab of the throttle is needed to get it going, then keep it at a lower level to maintain a steady speed.

- Takeoff

  You will be taking off into the wind. This will allow your ground speed to be lower, requiring less acceleration to get the necessary wind speed for takeoff. Your flying field may have a paved runway, or just a grass field. Even if it has a runway, there is probably the option of taking off on the grass. Most likely the airplane will be easier to keep straight when taking off on grass.

  If you are flying at a club, they will have regulations and procedures related to the use of the airfield. You may have to undergo flight training before being allowed to fly on your own. They may also require that you follow the direction of the runway(s) when taking off and landing, as compared to taking off sideways across the field.

  On the grass, keep the elevator stick all the way back as you get started on your takeoff run. Slowly increase the throttle, and as it gets going, slowly release the elevator to neutral. Allow the airspeed to slowly increase, and use the rudder to keep it going straight. Keep it on the ground until it's going significantly faster than its stall speed. If it's trimmed properly, you should be able to simply leave the elevator in the neutral position until it's ready to go. It may take off by itself, or you can pull back a tiny bit on the elevator stick. Use the ailerons to keep it straight as it climbs out, and use the elevator to maintain a moderate rate of climb.

  One word of caution: There is a 'ground effect' when the wing of plane is near the ground. This will be especially apparent with low wing aircraft. If the plane takes off with minimal airspeed, it doesn't take much to make it stall as the wings get higher off the ground. This is exacerbated by any tendency of the airplane to pull to the left with the 'torque effect.' The wing on the inside of the turn has less airspeed, and if it stalls, the plane will drop, rolling to the left, and you can end up doing a nice cartwheel across the runway!

Generally, you want to fly at times when there is little wind. If you have a crosswind, a couple of things will happen. First of all, while the plane is on the ground, it may have a tendency to 'weathervane' into the wind. That would especially be true of a tail dragger when the tailwheel lifts off the ground. Once the plane is in the air, the wind will simply carry the plane along in the direction that the wind is blowing.

As you climb out with a crosswind, simple turn slightly into the wind to keep it going along a straight line come out in the direction of the runway.

- Normal flight

Once you are in the air, things are much easier. You will be following a 'pattern' that has you turn 90 degrees away from the side of the field that you are on, then a short time later, make another 90 degree turn to take you downwind along the far side of the field. Just beyond that end you will do two more 90 degree turns to bring you back along the flight line that you were on taking off.

Do not fly the plane anywhere close to directly overhead. On the upwind leg of the pattern, fly along the line of the runway, which should be well in front of you. It's really easy to get disoriented if the plane is directly above, and also dangerous. The downwind leg most likely will be over the far edge of your flying field – perhaps slightly farther away if you have a rather narrow flying field.

Review the section on turns under "Principles of flight above." Keep in mind that right and left on the transmitter are from the pilot's perspective, so when the plane is coming towards you, it may seem like they are opposite if you are viewing it from your own perspective. A good way to level the plane out when it is coming toward you is to move the aileron stick towards the low wing. That will bring it up. Eventually, however, you will develop a natural sense of being in the pilot's seat, and it all ought to be quite natural.

Another thing you can do to help you get the feel of the control of the plane is to hold a stick in front of you as if it was a joystick on a full size aircraft. Lean to the right, and the stick will go to the right. That's initiating a right turn. Lean to the left, and you have a left turn. Lean backwards, pulling the stick towards you, and you are looking up, as the plane is going to go up. Lean forward, with the stick pushing away from you, and you are looking down – that's where the plane is going to go.

- Landing

Given that you have been practicing flying the pattern, you have a good start for being able to land the plane. There are three things to bring about for a good landing:

- Maintaining adequate airspeed to avoid a stall when turning onto the final approach.
- Getting the airspeed down to just over the stall speed by the time you touch down.
- Flaring out to touch down on the main gear. Not too early, not too late.

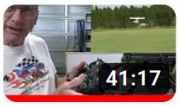
With many trainers you will cut the throttle around the time that you turn final. Heavier planes, or ones using flaps may require keeping on a bit of throttle. The nature of your airfield will also make a difference. With ours we are coming over a stand of trees, so we need to have a rather steep approach, requiring less throttle. If you are out in the wide-open spaces, and you can come in with a shallow approach, more throttle may be needed. This is

something you can practice with the idea that if you are coming in too fast, you can give it the throttle and go around for another attempt.

As you begin to learn how to land, make sure that there isn't hardly any wind. When you master it in those conditions, then you can try it with some mild winds. The wind will make it harder to judge your airspeed, and it is likely to blow you offline. You can steer normally to keep the plane on the line of the runway, crabbing into the wind. Then straighten it out just before touching down. For real finesse, you can lower the wing on the side that the wind is coming from to hold the line of flight straight at touchdown in a crosswind. That's tricky, because the wind will be gusting, requiring quickly varying amounts of bank to keep on the line.

Perhaps the biggest danger in windy conditions is when a fore-aft gust of wind triggers a stall. The stall speed of model aircraft is very low for our models as compared to full size aircraft. That means that the difference between the average wind speed and a gust is such that it can make your plane stall when you are coming in at the airspeed that you are comfortable with in an approach in low wind conditions. My advice there is to simply avoid flying in windy conditions!

Issues to watch out for:



Common Issues in RC Flight Training

RC Jim

- Aerobatics

Make sure you have mastered the precise control of your plane with normal, scale-like flying before you attempt aerobatics. For simple aerobatics like a loop or roll, you can have a go with the tips below. But, for inverted flight and more complex manoeuvres, you will want an experienced RC pilot to help you with them.

Loop. Start at a safe altitude, about as high as the diameter of the loop that you plan to do. Level the wings, give it full throttle and pull up on the elevator. Don't use the full elevator travel on the way up – make it a nice, large loop. At the top, pull the throttle back, and as it is coming down, give it a bit more up elevator to try to bring it back to level at the same altitude that you started from. Return the throttle to your cruising setting.

During the loop, the hardest thing is to keep the wings level. Initially, you will probably just leave the aileron in the middle position, and let the plane come out of the loop in whatever direction it wants to go. As you get more experienced, try to keep the wings level with the aileron. If the plane is starting off left to right, then if it is lowering a wing making it come towards you, give it a bit of left aileron. That will be true all the way around. Right to left, it is simply opposite to that.

Whatever is happening to the level of the wings, keep the elevator pulled back to get it around the loop. You can level the wings and turn whatever direction you want to go after it is right-side up again!

Roll. The key here is to begin with the nose pointed well up, and to make sure you have adequate throw on your ailerons to get it around at a reasonable rate. For your first attempt, do that to the extreme. Pull up to a 45 degree upwards climb. Then commence your roll. Once you have a good feeling for how well it goes around, then you can reduce that. Many model aircraft do not perform a nice, straight roll. They go into a barrel roll, and can end up going straight down near the end. If it starts up on an angle, then it's more likely that it will

end up in a recoverable position. Of course, a good aerobatic plane will not have that tendency, but you may be flying a trainer!

- Flight simulator

  A flight simulator, such as Real Flight, has its place. Initially, it can help one to get accustomed to what the stick controls do in various situations. Later on, you can use it to try more aggressive manoeuvres before you try it on something that breaks when it crashes!

  So, here is how to get started with it:

  - For the setup, follow the instructions, downloading the software and set up a separate plane on your transmitter. Don't use the same 'plane' on your transmitter for the flight simulator as the one that you use for your 'real' plane. Create one that's only used for the simulator, even if it is the same as the one you are actually flying. Settings for each of those might be different, and it's handy for the flight simulator plane to already be in the flight simulator mode.
  - Try the built in training program. It has a "learn to fly" segment that uses an easy to handle trainer.
  - Fly on own outside of training program, using the trainer aircraft. Work on precise turns and level flight around the pattern. After several of those, cut the throttle as you approach the runway, keep the plane lined up, then, before touching down, give it the throttle and go around. Eventually, allow it to land, and see what happens! Make adjustments to when you cut the throttle to get the right airspeed at the point where you want to land. Land without flaps.
  - Try a number of constant altitude manoeuvres. A circle, S turns and a figure 8.
  - Work through same set of tasks as with instructor below.
  - Change aircraft several times noting the differences in handling: takeoff, ordinary flight and landing.
- RC car driving (optional but beneficial)

  A big part of the training is working out which way to push the stick to turn. It's easy to get confused when the plane is coming towards you. Driving the RC car will help you with that. Also, if you are driving on a defined track (blocks of wood on my driveway), then you can be developing the fine adjustments on the positions of the sticks to go smoothly around the track in very precise positions. Those fine 'motor skills' are important to develop.

  Ideally, use a transmitter with sticks – such as the one you will be using with your plane. Given that you are going to fly mode 2, have the throttle on the left stick, but put the steering on the right stick. That's because in the plane, most of the time you are going to mainly use the ailerons to turn, not the rudder.

- RC plane with instructor

  Given that you don't want to spend megabucks on replacing smashed aircraft, you will want to begin flying with an instructor. Fortunately, they are easy to find, and their services probably will not cost you anything beyond the membership fee to join a club. And that's also likely to be very reasonable.

  So, Google "RC airfield near me," and most likely, you will have one or more to choose from. Give them a call, or fill in an enquiry form, and let them know what days of the week you generally would be available, and they can link you up with an appropriate instructor. At our

club, you can have your first flight with a club airplane to see if you like it before spending any money. Then, when you are ready to take the plunge, you can get recommendations from your instructor as to what plane to buy, as well as a transmitter that is compatible with what they have.

The instructor will connect a club transmitter to yours via a wireless link, and get the plane up in the air flying straight and level. He or she will then say, "your plane," pressing the button (or flipping a switch) that gives your transmitter control of the airplane. Should you get in trouble, the instructor simply calls out, "my plane," lets go of the button or flips the switch back and he or she has control again to bring it back to straight and level.

Here are the basic steps you will go through:

FMS Ranger 1800 RC Trainer Demo

RC Jim

- Flying after the plane is in the air.
  - Use an easy to handle trainer, such as FMS Ranger 1800. Big, light weight, high wing planes make excellent trainers.
  - Your instructor will help you with this as described above.
- Flying the pattern. See "Normal flight" above.
- Flying with S turns downwind.
- Landing approach to about 3 m above ground, then go around.
- Takeoff.
- Takeoff and landing. After the instructor and student are confident with this, the instructor remains available to take control, but only if absolutely necessary.
- Level loop. (Circle with no change in altitude)
- Level figure eight.

- Solo.
  - No 'buddy box,' so you are the only one in control of your airplane. Your instructor will be at your side to give you verbal instructions, but it is up to you to make it all happen.
  - Practice of all the above with a focus on precision. Most of this can be done without your instructor.
- RC plane, again with instructor
  - Stalls and recovery. Demonstrated by instructor, then performed by you.
  - Use of flaps (if available)
    - Low level, slow pass with each stage of flaps.
      - Use of throttle to maintain altitude, but low speed.
    - Landing with each stage of flaps.
      - When to engage flaps.
      - Throttle setting at each stage of landing.
      - Managing throttle during flare and touchdown – observing airspeed relative to stall speed.
  - Dead stick landing. If you get in trouble, the throttle can be used to recover. With practice, you should then be able to cut the throttle at any point in the pattern, and have a safe landing. If others are flying with you, choose a point that is not likely to

interfere with the others, then call out, “dead stick, landing left to right” (or the opposite), and bring your plane down onto the field. Ideally, that will be into the wind, like normal, but in certain cases you will need to land at a higher ground speed, going with the wind. Better to get it down safely on the turf than to try to do a sharp turn down near the ground.