



RC Plane Setup Tips

The success of your flying is very much dependent on the quality of your setup. If everything is haphazard, expect some crazy things to happen during your flights. You can probably find some sort of excuse – “it’s that dead spot where you turn onto the base leg...” – but the real reason is likely to be more basic, and something you can control. Your setup.

Begin with the build

The quality of the build is vitally important. And just because you bought a new ARF doesn’t mean that everything is right. And, if it’s a second-hand plane, buyer beware! I discovered an aileron broken off halfway after a couple of flights with a new foamy. The first crash, and maybe the second as well, of my VQ Dauntless dive bomber was due to a dive flap hinge coming unstuck during flight. That was glued in place by the manufacturer.

Some of those sorts of issues will sneak past you, just like some did for me, but that’s only a reason for each of us to redouble our efforts to make sure things are right before the plane takes flight!

So, what build items need to be checked?

- Servo mounting
- Servo arm screw in place
- Servo arm is perpendicular to the control rod when stick is centered, ideally with no trim or subtrim.
- Control arm attachment point is directly over the hinge line. An exception could be for flaps or dive brakes that go only one direction.
- Take loose the control rods from the control horns and check freedom of movement of the control surfaces. I had one plane that everything checked out after replacing the aileron hinges, only to discover later that the glue must not have been set when I checked it, because later on, one hinge was glued together – it didn’t bend! Moving the joystick still made the aileron move – just not as much as the other one!
- Control arm end connectors
- Check to see that either the servo end or the control horn end has the control rod attached to the outermost hole. This minimises slop. Where the other end is attached will be determined by what is needed to get full travel with a 100% signal going to the servo. If you are setting that up, use a servo tester so that you can go slowly and stop when you need to before damaging something.
- Tug on every control surface to make sure hinges are solidly attached

Note that it might be wise to enable much larger control throws than recommended in the manufacturer’s instructions to enable you to recover from low-speed glitches. If you do so, I would recommend that you first set it at the manufacturers rate & expo. Then move the stick halfway and note the μs value. Next, increase the rate to the amount you think might be needed.

With that done, move the stick halfway, and increase the expo until you have the same μs value as what you had before. This will make control response pretty much identical to the manufacturer’s recommendation through normal stick movements and still give you an ‘emergency’ level if something strange happens.

- Wiggle control surfaces to make sure there isn't excessive slop
- Check control throws. At 100% rate you should have the maximum physical travel. At the set rate you should have the throw recommended.
- Check structural integrity. Wings on solid, etc. Put light pressure on various places to look for weakness or poor glue joints.
- Check CG with battery in place. Move the battery or add weights to get it precisely at the manufacturer's recommended position. If you don't have that information, check out our video on calculating a good CG position. When balancing it at the recommended spot make sure the plane sits level at that spot. If it's tilting forward or backward, then you are not on the plane's CG position. After the maiden flight and setting trims you can then determine whether or not to adjust the CG position. When adding weights, choose the most extreme forward or aft locations that are practical for mounting them. Less weight is needed that way. With the plane on a stand, you can set the weight (or tape it) on the plane above that location, then check to see if more or less is needed. Once you have that worked out you can stick them on, and then recheck.

Maiden flight considerations

First, if anything isn't quite right, it isn't right! Delay your flight until it is.

Before you go to the field, power it up at home in a safe place, and check everything you can:

- Model is clearly identified in your TX.
- Available telemetry that you want to see is displayed on your TX screen.
- Every control surface moves in the correct direction, and doesn't move when it is not supposed to.
- Ailerons each go up the same distance (or angle) with full stick movement. And down.
- Flaps each go down the same when deployed.
- Prop nut is tight.
- Motor spins in the right direction, blowing the air back!
- If you have retracts, they operate properly through several cycles.
- Batteries for the plane and in the TX are fully charged.
- If the plane is to be disassembled for transport, have a container for loose parts and make sure you bring it!
- If you are using an external module for the TX, make sure you have it and the antenna.
- Before leaving home, make sure you have everything you need, including tools for assembly.

At the field

- Assemble. Don't chat about other things with bystanders until you are done. Focus.
- Review everything that needed to be done in assembly. One by one. All done?
- Check battery voltage. Fully charged?
- Put the battery in place, but do not connect.
- Double check the CG.
- If using an external TX module, make sure it is in place and the antenna is attached snugly.
- Turn on the TX. Verify you have the right plane. Throttle down, throttle locked.

- Plug in the plane battery.
- Check control directions for everything. Not just wiggling sticks and seeing controls wiggle. Make sure each one is going in the right direction.
- If you are not using ELRS, do a range check. With ELRS have an alternate method. I use the dynamic power setting, so I know if it's on 25 mW that it's good. You should also have a warning set up for low reception and low battery.
- Have your timer set for a conservatively short flight. Adjust it after a few flights.

The maiden flight

- Check controls at the flight line.
- Taxi around a bit. Give it some significant throttle for a moment and see how hard it pulls left.
- Tail draggers
 - Taxi at a moderate speed and see if it has a tendency to nose over. Should it start to lift off, cut the throttle. If that happens try again with quickly backing off up elevator to neutral or even a slight bit of down elevator to lift the tail. Given that it doesn't want to nose over, use slight adjustments to the elevator to hold the tail up and keep the plane on the ground.
 - Note that one of the most common take-off problems with tail draggers is for them to lift off before they have enough airspeed to avoid stalling. The low tail and ground effect will tend to make that happen. So, you want to keep it on the ground long enough to get a bit of excess speed. That means you need to hold it on the ground with the elevator.
- Torque effect
 - As we have mentioned before, a single engine plane likes to pull left when the motor is revved up at a low airspeed. A small part of this is from the motor applying torque to the prop, spinning it clockwise (pilot's perspective). That is in turn trying to twist the plane counter-clockwise, which would make the plane roll to the left. But it is being counteracted by the spinning airflow hitting the wings and tail surfaces, which is trying to roll the plane to the right. All of those forces are being applied at a short distance from the centreline of the plane, and torque is force times distance. So, as far as roll is concerned, there's little overall effect. But that's not the case with yaw. As the prop wash hits the vertical stabilizer, way back on the tail, when it comes to yaw, that's a long way from the CG, and there is nothing to counteract it. The spinning airflow hits the vertical fin on the left side, pushing the tail to the right and turning the plane to the left.
 - If this starts to happen on your take-off, cut the throttle. Taxi back and try again.
 - The way to avoid it is 1) very gradually increase throttle on your take off run, using the rudder to stay straight, and 2) you will get a feeling for how much rudder is needed at different throttle positions, so as you increase it, anticipate what is going to happen by moving your throttle stick up and to the right to match what the plane needs to stay straight.
- Fly very conservatively, staying in the pattern, but maintaining significant altitude – three mistakes high!
- Adjust your trims going down the downwind leg of the pattern. If you are not confident of doing this yourself, get a friend to push the tabs for you as you direct. Later we will do

some fine tuning on this, but for the moment we are happy if the plane is basically flying straight and maintaining constant altitude.

- Once the trims are set, try some low speed flying on the downwind leg. Get a feel for how it is going to handle when flying slow. Give it more throttle before making your turn to the base leg.
- Try a landing approach, flying a little faster than what you think it needs. For most planes throttle will be on as you turn to land, but then cut way back as you descend to the start of the field, then applied as needed to maintain an appropriate landing speed. With this first approach it may very well be too fast, so don't try landing at the very end of the field. Go around and try it again a bit slower.
- You may find that it is easier to land without flaps. That will depend on the aircraft, but with flaps most likely you are going to need throttle throughout the landing approach. It can be tricky to know how much is needed, and if you pull up a bit early, it's really easy for the plane to slow down quickly and stall.

Fine tuning

With your maiden flight out of the way, fly it several more times to get comfortable. We are then ready for some fine tuning.

Trims

- Fly the plane in close to you over the field, then turn so it's flying directly away from you. If the wind is blowing, you need to be flying directly into or away from the wind. Avoid a crosswind. See if it is 'dog tracking.' With that the plane could be flying on a track directly away from you, but the fuselage is turn to one side or the other. If it is, trim the rudder while also using the ailerons to keep the wings level.
- Once that is done, fly the same path, but now trim the ailerons.
- With that completed, double check the elevator trim

CG

- You are flying with the recommended CG position. That may be perfect, but often it will err a bit on the nose heavy side to be easy to fly and have good stall characteristics. If you are not doing aerobatics, that's fine...
- So, to check the CG, as you approach the field at a moderate height, pull up into a 30 degree climb and a bit over mid-throttle. Let go of the sticks and see if it goes straight. If not, re-check your fine tuning of the trims. If it does go straight, roll inverted and let go of the sticks, at least momentarily. By this time you should have lots of altitude. If it wants to nose over toward the ground, push away from you with the elevator stick, and after the upwards flight path has been restored, roll back to normal flight.
- If you had a significant nose over towards the ground, then your CG is too far forward. Land the plane and move the battery back, or if it cannot go any farther add some weight to the tail. Check the CG location by balancing the plane on your fingers. Unless it was way off, you probably only want it to move 5 mm at a time, then test it in the air again.
- Ideally you want the plane to only need a very light touch of down elevator when inverted to maintain the flight path.