

12 Aerobatic Setup Tips You Need to Know

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Once you master basic RC flight and start progressing to bigger, faster and more maneuverable airplanes, aerobatics start to enter your aviation mindset. Sure, anyone can pull back on the stick to perform a loop, but what's really needed to become a skilled pilot is understanding how to execute maneuvers properly and how to fly them smoothly. Here are some flight and setup tips to make your learning curve less steep and more enjoyable. No one is born an expert, but it doesn't take long to start flying like one!

WHERE TO START?

1 When it comes to aerobatics, you have a choice of style. There's sport (for the fun of it) aerobatics, precision and pattern aerobatics, competition fun-fly aerobatics and 3D unlimited and freestyle. Even the most accomplished champion had to start somewhere and for all of us, it's sport aerobatics that teaches us the basics. The best way to learn the ropes is to go out and attend some contests. Unlimited, 3D throwdowns and "Huck Fests" are amazing and you'll get a good feeling for how the advanced guys set up their equipment. For really amazing, close-to-home events, nothing beats competition fun-fly events! This is down-on-the-deck aerobatics and very exciting. Many events now are enjoying an increase in the use of electric-powered airplanes, so you'll feel right

at home.

PICK A PLANE

2 For a plane to be a good choice for aerobatics, it needs to have a good power-to-weight ratio and light enough to have a pilot-friendly wing-loading for slow landing and stall speeds. There are hundreds of good planes to choose from and the best place to start looking is at your local flying field. Chat it up with the more experienced pilots and see what's popular. For electrics, the field is wide open for size and power systems and most if not all today are plug and play. Just stick with what works and experiment a little and fine-tune the plane to suit your needs and style of flying.

Selecting Servos



3 With a good transmitter and receiver, better-than-average servos are the next important ingredient. A servo has to be both strong enough for increased flight loads on the control surfaces, plus it has to be smooth and have good centering qualities. Sloppy servos may be less expensive, but your flight performance won't be precise or consistent. If you want the best in power, speed and centering, consider digital servos.

PROPER BALANCE



4 Often overlooked even by experienced pilots, the balance point of each airplane has to be correct for proper control and performance. There's a range of balance for every wing type and you should always start in the center of the range for your first few test flights. The position of the Center of Gravity (CG) is also very important as it affects the pitch stability of your plane. As the CG is moved aft, the plane becomes more sensitive and more responsive and less elevator throw is needed. Moving the CG forward makes the plane less sensitive to pitch inputs and requires more elevator deflection especially during flare for landing.

Radio Systems



5 Evaluate your airplane and radio equipment. It is possible to learn aerobatics with a basic no-frills radio, but you will get better quicker if you have a programmable radio that makes control setup and servo throws and mixes easy. There are many 6- and 7-channel radio systems to pick from and they give you the flexibility you need for advanced performance. Remember, you don't need the most expensive airplane to fly aerobatics, but you do have to set it up properly.

GET IT STRAIGHT



Setting up your models' control surfaces with an accurate throw/deflection meter makes adjustments quick and accurate.

6 Whether you're building a kit or an ARF, for your airplane to fly straight, you have to build it straight. This starts on the workbench and goes a long way in minimizing unwanted trim adjustments. Make sure your plane's wing and horizontal stabilizer are level with each other and square to the fuselage centerline. Measure the distance from the wingtips to the tail. The distance should be the same on both sides. Also, check for warps or twists in the tail or wing. Fit any misalignments to make sure you have a true airframe.

CONTROL THROWS



Control linkage setup and proper hinge installation are key to precise control response.

7 For maximum control authority, keep the linkage attachment points close to the center of the servo (short output arm) and further way from the hinge at the control surface (long control horn.) Also, bump up your standard-size pushrod and clevis hardware to 4-40 size. Use solder clevises at the servo arm and use a jam-nut at the clevis to lock it into place. Use clevis keepers to prevent them from popping off the control horns during flight. When it comes to setting control throws, start with the recommended amounts stated in the instructions and then test fly to confirm they feel right. You want only as much control throw at maximum deflections to complete your desired maneuvers. Anything more makes it harder to fly smoothly and can lead to over controlling your plane.

Servo Linkage

8 This is where precision is created. With proper setup, you maximize your servo's ability to control the plane by minimizing slop and play in the linkage that connects the servos to the control surfaces. By increasing the leverage of the servo, you also minimize the chances of flutter which can cause your plane to crash. Airplanes that are constantly in need of retrimming usually have a substandard control linkage setup. Always use strong control horns and attach them securely. Hinging too should be smooth and bind free. Don't use CA cloth hinges, use larger pinned hinges and install them properly to minimize the hinge line gap between the fixed and movable surfaces.

POWER AND PERFORMANCE



9 If your plane has a motor size range, select the more powerful power system. You want a good power-to-weight ratio to help execute vertical maneuvers and extend up-lines. You also want to match your motor, battery pack and speed control so everything works together without overheating or drawing too much current at full power. Make sure there's adequate airflow to keep you controller cool and attach it securely so it does not move around during flight. This can strain the wires and connectors not to mention damage the controller itself. If you are using a programmable speed control, be sure to disable the propeller brake function and select a Soft Start setting for the throttle response.

PICKING A PROPELLER



10 Start with the recommended propeller but don't be afraid to experiment. In general terms, electric motors can turn larger diameter propellers than equivalent 2-stroke engines. Also, propeller pitch for aerobatics should be lower than sport flying props. A lower pitch is like a lower gear in a transmission, it gives you more acceleration but less speed. Higher pitches give slower acceleration but a higher ultimate speed. Aerobatics also require good climb performance so the lower pitch is desired. Diameter changes affect current draw more than pitch changes do, so be sure to test each prop. Use a Watt meter and find a prop that gives you

maximum performance while keeping the current draws at safe levels for your battery pack and speed control. Also, always be sure to properly balance your propellers to minimize vibration.

ENTRY AND EXITS

11 All aerobatic maneuvers are built on a solid foundation of straight-and-level flight. Whether you are beginning or ending your maneuver upright or inverted, you should concentrate on keeping the wings level and the flight path parallel to the centerline of the runway. Even with knife-edge flight, you need to be straight with wings vertical. If you are not properly lined up, when you pull or push into the vertical, it will be angled one way or the other requiring you to make corrections.

PRECISION & PLACEMENT



12 All maneuvers are made up of segments of straight lines and radius turns. A loop is one continuous radius line that begins and ends at the same place. A square loop is made up of four equal length straight lines with four $\frac{1}{4}$ loops (one in each corner). Precision is the ability to make all the segments the same size and radius. When it comes to placement, you want to center your maneuvers in front of yourself with equal entry and exit segments. This is known as using the aerobatic box to full advantage. An excellent reference for various aerobatic maneuvers is John Glezellis' *Aerobatics Made Easy* DVD series available at AirAgeStore.com.

That's it! As with anything worth doing, it takes a great deal of practice to perfect your piloting skills and to fine-tune your aerobatic performance. Take it one step at a time and learn from each flight. Understand how to correct your mistakes and don't get ahead of yourself. Move on to more complicated and challenging maneuvers only after you've mastered the basics in all types of weather and wind conditions. Before you know it, you'll be the show pilot everybody wants to copy! Fly often and remember to have fun.