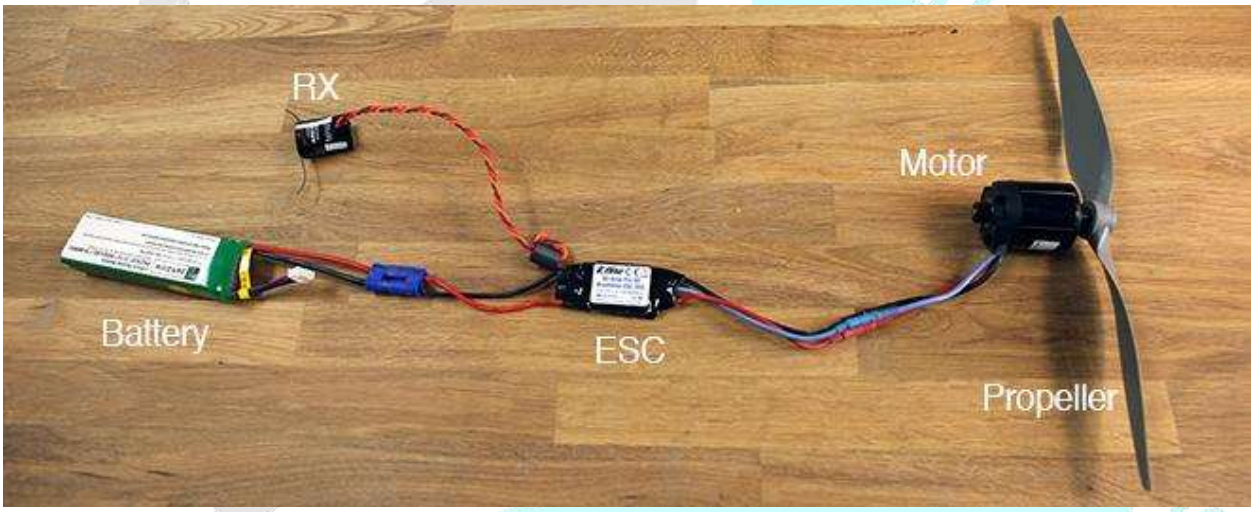
Radio Controlled Power System

A radio controlled power system will usually consist of:

- Propeller
- Motor
- ESC (Electronic Speed controller)
- Battery

Each of these components should be properly match to get good performance and reliability.



Propeller

- There are two numbers that are important. The first number is the diameter (in inches) and the second number is the pitch. These numbers are usually molded into the front of the propeller. (Example: 10 X 4.5)
  - Diameter - The size of the propeller (total length) measured in inches. The diameter of the propeller depicts the thrust generated.
  - Pitch - Pitch is a little harder to understand - The number indicates how far the propeller wants to travel forward in one revolution. A higher pitch propeller is meant for higher speeds and will be less efficient at slower speeds. It is similar to a bike or car in a higher gear. The acceleration is going to be less but the top speed is going to be greater. A lower Pitch prop is going to grip better and give you a faster acceleration however, it has a lower top speed.

- Types of Propellers:
  - Electric propellers - Stiff, made for normal to high RPM
  - Slow fly electric propellers - Normally flimsy, made to generate a lot of thrust at low speeds - Used on indoor and slow flying airplanes. Can break at higher RPM's.
  - Gas propellers - Built very stiff and sturdy to take the abuse of the motor, don't use on electric - not as efficient.
- Choosing the correct prop for your plane:
  - Always try to find the manufacturer recommendation first. If you can't find it, search the internet, or R/C forums.
  - Use a calculator .Play around and find the best options for the whole power system.
  - SUPER IMPORTANT! - Numbers always face forward! Check the airfoil of your blade the rounded surface points forward. If your prop is on backwards it'll produce less thrust and draw more current. This is a common mistake.

Motor

There are fuel engines, brushed motors and brushless motors. The most common type of motor for park flyers is the Electric brushless motor.

Two different kinds of brushless electric motors:

- Inrunner - Only the shafts spins - Normally used in fast airplanes, EDF's, or cars.

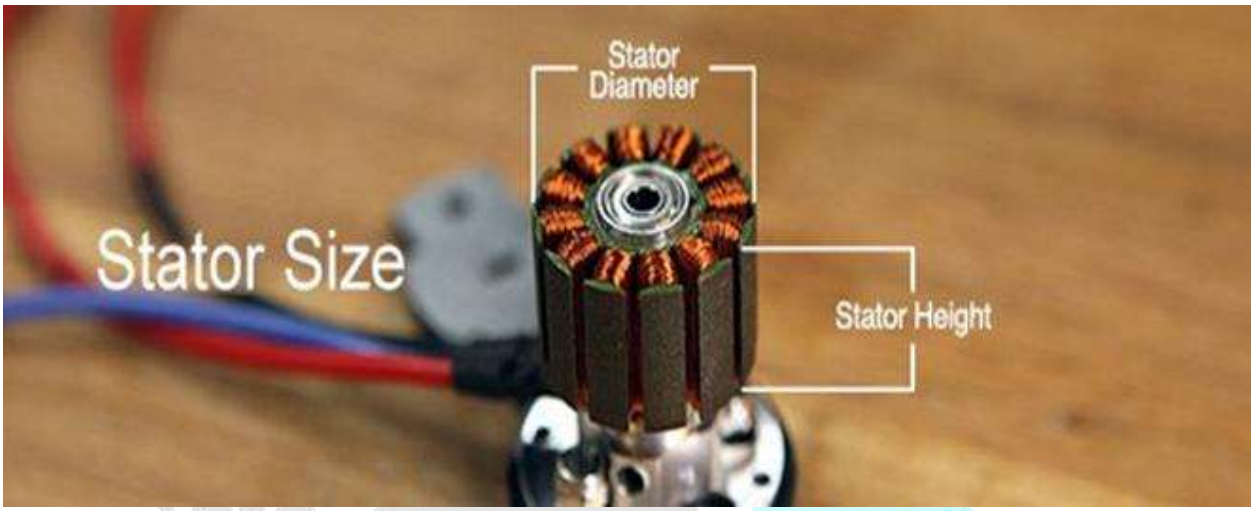
- Outrunner - Far more common - Has more torque, the whole outside of the motor spins. There are motors of every size and shape.

Choosing the right motor for your plane:

- Always try to find the manufacturer recommendation first. If you can't find it, search the internet, or R/C forums.
- Good rule of thumb: You need 75-100 Watts per pound for a trainer, 150W per pound for pattern or warbirds and 200W+ per pound for 3D and EDF Jets.
- The 80% rule! If a motor is rated for 100W count that as a 80W motor. Will save you tons of problems down the road and give yourself headroom.
- Use a calculator .

There are 3 different parameters that are important to understand when choosing a motor:

1. Motor size
2. Power Rating
3. kV Rating



Sizing

Determining the motor "size" can be very confusing as different manufacturers measure differently. Some measure the stator size (the inside of the motor), some measure the whole case. Some use glow equivalent numbers. (Example: Power .15) The most common indicator for motor size is the stator size. It's usually formatted like this: 2210-12 first 2 digits are the diameter in mm. The next two digits are the height in mm. The last number, after the dash is the number of "turns" for each winding. The weight (measured in grams) of the motor is another way to determine the size of your motor.

Power Rating (normally in Watts)

This way of rating a motor can be tricky. The wattage is rated differently at different voltages so be careful. Example: 150W at 15V is only good for 100W at 10V as it's the current that is important. It's a basic function of size - Larger motors can produce more power and not overheat as easily as a smaller one.

kV Rating

kV - NOT KILO-VOLT it's a small k (k represents constant.) kV stands for Revolutions per minute / per volt. A 1000kV motor will spin 10,000 RPM on 10V. This rating is calculated when the motor has no load. kV rating has nothing to do with how much power the motor can produce. It represents how fast the motor wants to spin. The kV rating is useful to help determine the size of the prop.

Important Note:
Whenever you change the propeller diameter or pitch it will change the current draw and

performance. You can measure this using a watt meter to ensure you're not pulling too many amps.

ESC (Electronic Speed Controller):

Important things to consider when choosing an ESC are the Current, Voltage and weather or not you need a BEC.

- **Current Rating**
  How many amps the ESC can deliver continuously. Many ESC's will also list a 'max burst' (usually 10 seconds or less.)
  - This is NOT how much power it will pump out to the motor. It is how much current the ESC can govern before being destroyed.
  - An ESC capable of more amps is not going to hurt anything. It is only going to weigh more.
- **Voltage Rating**
  - ESC's usually have a voltage range they can operate within. Normally it'll be printed directly on the ESC. If you exceed this voltage the ESC will most likely not work, or will be destroyed.
- **BEC**
  - The Battery Elimination Circuit is what powers the Receiver (RX.) Unless you are powering your receiver from a separate battery, you will need to make sure your ESC has a BEC built in.

Choosing the right speed controller:

Look at the amp (or watt) rating of your motor. Use the 80% rule! If the motor is rated for 10 amps get an ESC capable of 12 amps or more.

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