



## Electric Power Systems Workshop #1

*Intro to e-power by Steven DeMar*

Where to start when selecting your power system:

<i>Power loading (Watts/LB)</i>	<i>Desired flight characteristics</i>
50	<i>Trainer</i>
100	<i>Sport aerobatics. Roughly 1:1 thrust-to-weight</i>
150	<i>mild 3D aerobatics, okay vertical performance</i>
200	<i>Hover at ½ throttle, great vertical performance. Mild EDF jets as well.</i>
300+	<i>EDF jets with vertical capability, and fast propeller planes (pylon racers, ect)</i>

A good starting point is to figure out how much power will be required to fly your airplane the way you want. This can be determined using power loading (the amount of watts per pound of airplane). The table to the right gives a few rules of thumb on power loading. Please remember that these are only guide lines, and that it doesn't hurt to be somewhere in between.

Okay, so I know how much power I need. What's next?

It is now a good time to figure out how much current (Amps) at which voltage you need to fly your airplane. While thinking about this, keep in mind that it is best to have a higher Voltage and lower current, simply because more current puts more stress on the battery. You can calculate the current needed using the equation

Power = Current X Voltage. Take a look at the table to the lower right for nominal voltages of LiPo batteries. The max voltage that you can use is determined by the K/V (RPM'S per volt) of your motor. More on that later.

Number of cells in series	Nominal Voltage
1S	3.7V
2S	7.4V
3S	11.1V
4S	14.8V
5S	18.5V
6S	22.2V
7S	25.9V
8S	29.6V
9S	33.3V
10S	37.0V
11S	40.7V
12S	44.4V

Let's take a look at my 6-pound Eindecker as an example. I wanted good sport aerobatic capability, but not 3D, as the airframe is not built to take that type of flight. So, I went for 600-watts, and 40 amps on a 4-cell lipo battery. This is well below the manufacturer's 52-Amp max discharge rating.

... *And the results:* Just as I hoped! The airplane will go vertical from takeoff for a little bit, and then stop and hang on the propeller. My setup turns a 14X10 beech wood propeller at around 7000-RPM, for exactly 6-pounds of thrust.

What to look for in the next series of workshops:

- *How to select the best motor and ESC*
- *How to select the best battery*
- *A look at some different chargers, including a mini-review of the Turnigy 420 LiPo charger!*

If you have any questions, please contact me at [stevenmdemar@gmail.com](mailto:stevenmdemar@gmail.com) or at 575-932-8183. Happy flying!