## Website of the Month

This month's website is a company called **Small Parts.** I dealt with them when I worked at Hampton University. The company's slogan is "The hardware store for researchers & developers". I believe you will find many items that are relevant to RC Airplanes. Here is the link:

http://www.smallparts.com/

**Do you have a favorite website? If so, let me know and I will put it in the newsletter. Favorite online store, how to build, how to fly, etc- send me the link! My email address:**

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## Training Column

In the November CVA meeting, John Backes gave a lecture on choosing a power system for an electric model. He gave the members present at the meeting an information sheet. I wanted to put the information sheet in a training column and add it to the website training columns page to ensure easy reference for the future. Here is John's information on choosing an electric power system:

# How to choose a power system for an electric model – John Backes – 11/10/11

"Power system" includes the motor, Electronic Speed Control (ESC) and the battery.

**1. Parameters**

a) Voltage – Normally specified as a range of voltages or number of cells.

b) Current - Amps may be specified as either continuous or burst (for a number of seconds) or hopefully both.

c) Watts – measure of the input power that the motor can handle. Watts may be specified as either continuous or burst (for a number of seconds) or hopefully both. You should have a Watt Meter to measure your installed setup. The propeller selection has a large effect on how much power a motor uses.

d) KV – This relates to the rpm of the motor.
1) A 2000 KV motor will spin twice as fast as a 1000 KV motor using the same battery voltage but will need a much smaller prop to limit the watts.
2) A 1000 KV motor can spin at the same speed as a 2000 KV motor if it has twice the voltage. These two setups will use similar props.

**2. Motor** - You need to choose the motor first and then size the other pieces accordingly. The follow methods can each be successful but a combination will probably give the best results:

a) Follow the manufacturer's recommendations

b) Choose a system that is equivalent to the manufacturer's recommendation. The important parameters are Maximum Watts, Volts, KV and Weight.

Watts are given in the specification sheets on many motors. If not, then calculate by multiplying the voltage by the current. (Use 3.3 Volts per cell for Lipo and 1.0 volt per cell for Nicad/NiMH).

c) Research what others are using for the model that you have chosen or a similar model. For example, if you are building a 40" P-47 and cannot find information then the information from a 40" P-51 would be a good starting point. My favorite website for this is the Ezone. The address is http://www.rcgroups.com/forums/index.php and there are many discussion groups such as "Electric Warbirds"; "Glow to Electric Conversions"; "Indoor and Micro Models"; etc. Go into the appropriate area and then use search.

d) Use the rule of thumb for power requirements (based on flying weight of the model):
- Less than 50W/lb - very lightweight / low wing loading slow flyer.
- 50 to 80 W/lb - powered gliders, basic park flyers and trainers, classic biplanes and vintage ('Old Timer') type planes.
- 80 to 120 W/lb - general sport flying and basic/intermediate aerobatics. Many scale (eg warbirds) subjects
- 120 to 180W/lb - more serious aerobatics, pattern flying, 3D and scale EDF jets
- 180 to 200+W/lb - faster jets and unlimited performance!

**3. Electronic Speed Control (ESC)** – Size you ESC so that it can handle the maximum current that your setup will pull. There is usually only a small cost and weight difference to go to the next higher capacity ESC.

**4. Battery –** The battery must have enough current capacity to exceed the maximum that the motor will require. Calculate by multiplying the battery capacity by the C rating. A 2000 Mah is the same as 2Ah. If the C rating is 20 then the maximum current capacity is 40 A (2 X 20). The battery will last much longer if you do not run it at its maximum capacity.

**5. Example –** I have a 2 pound scratch built airplane and therefore have no manufacturer's recommendation. I want it to be very aerobatic and therefore want 150 W/lb or 300 watts. One place that I go for research and buying is Headsup RC. They have good prices, very fast and inexpensive shipping and more information on motors that other sites that I have used. The website is http://www.headsuprc.com.

| # | Motor | Weight | Voltage | Current | Watts | KV | Cost |
|---|---|---|---|---|---|---|---|
| 1 | Power 480 Plus | 3.6 oz | 3-4 lipo | B35/ 60 sec | B380/60 sec | 1000 | $25.95 |
| 2 | 3536-10 | 3.7 oz | 2-4 lipo | B35/30 sec | B475/30 sec | 1050 | $25.95 |
| 3 | Emax GT 2812/10 | 3.4 oz. | 2-3 lipo | B27/30 sec | B320/30 sec | 970 | $26.95 |
| 4 | 2814/06 | 3.6 oz | 2-4 lipo | 24 B32/60 sec | | 1290 | $27.99 |

B indicates burst

All four motors are very similar in weight and price. The differences that I would use in making my decision are KV and voltage. Motor #3 has the lowest KV and therefore will swing the biggest propeller. Motor #4 has the highest KV and would need a smaller propeller but would probably have the highest speed. There is some discrepancy in the watts listed. Watts = voltage X current and the voltage used in the calculation by the different manufacturers is not consistant. Motor #1 is 10.85, motor #2 is 13.57 and motor #3 is 11.85. So motor #2 is calculated using a 4 cell battery and the others are using a 3 cell although they are using different voltage. The rule of thumb above is to use 3.3 volts/cell. Assuming a 3 cell battery and rounding the voltage to 10.0V then the max watts of the 4 motors would be 350, 350, 270 and 320 respectively. I would probably avoid Motor #3 since it might not meet my 300 Watt requirement. The other 3 motors would be acceptable choices.

The **Power Up 32 Sport** is a 7.5 ounce, 800KV, 800 watt outrunner brushless motor that is roughly equivalent in power to .40 and .46 size two stroke glow engines. It's a good choice for sport and scale airplanes weighing 3 to 6 pounds, or 3D planes up to 4 pounds.

The **Power Up 32 Sport** is designed for use with 3, 4 and 5 cell Lipo batteries. When using a 3 cell Lipo, the APC 12x8E is a good prop for sport planes. The APC 13x6.5E prop can be used for maximum thrust, and is a good choice for 3D flying. If you're after high speed, the APC 10 x7E or 11x7E props can be used with a 4 cell Lipo., or use a 9x6 prop with a 5 cell Lipo.

We recommend using a 50A to 70A Electronic Speed Control (ESC) with this motor.

**MOUNTING OPTIONS:** The **Power Up 32 Sport includes an X mount** for mounting the motor in front of a firewall. A **5mm Prop Adapter** is included for mounting props on the motor shaft.

**Propeller data for the Power Up 32 Sport using a 3-cell Lipo battery:**
It's a good idea to balance all propellers with a Propeller Balancer before using them on this motor.
Rotating propellers are dangerous. Please stay clear of prop and wear eye protection.

**APC 13 x 6.5E:** 86 oz thrust at 45 amps, 530 watts

**APC 12 x 6E:** 68 oz thrust at 32 amps, 380 watts

**APC 12 x 8E:** 67 oz thrust at 40 amp, 470 watts

**Propeller data for the Power Up 32 Sport using a 4-cell Lipo battery:**

**APC 11 x 5.5E:** 86 oz thrust at 41 amps, 650 watts

**APC 11 x 7E:** 88 oz thrust at 47 amps, 740 watts

**APC 10 x 5E:** 66 oz thrust at 27 amps, 430 watts

**APC 10 x 7E:** 72 oz thrust at 36 amps, 570 watts

**Propeller data for the Power Up 32 Sport using a 5-cell Lipo battery:**

**APC 10 x 5E:** 95 oz thrust at 39 amps, 750 watts

**APC 9 x 4.5E:** 74 oz thrust at 30 amps, 600 watts

**APC 9 x 6E:** 71 oz thrust at 36 amps, 700 watts

**Power Up 32 Sport Specifications:**

**Weight =** 7.5 ounces (212 grams)

**Diameter =** 1.65 inch (42 mm)

**Motor length =** 1.7 inch (43 mm) from motor base to tip of rotor

**Shaft =** 5mm x 0.6 inch

**Voltage =** 9 - 21 volts (3, 4 or 5 cell Lipo batteries)

**Current =** maximum of 50 amps for 60 seconds

**Watts =** maximum of 800 watts for 60 seconds

**KV (rpm/v) =** 800

Mounting holes are spaced 30mm across center of motor and are tapped for 4mm screws.

E-mail a friend about this item.

See you at the field.

Alan Fry
Training Coordinator