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AIR WAVES

July 27, 2009

NOTICE OF MEETING

The next meeting of the Regina Windy Flyers will commence at 7:30 PM on Monday July 27, 2009 at The Regina Windy Flyers Clubhouse, Kings Park Model Airport, Regina, Saskatchewan.
RWF Web Page http://nonprofits.accesscomm.ca/reginaflyers/

PRESIDENTS MESSAGE

Hello fellow flyers.

I think we finally will have some summer, it would be even better if the wind would settle down a little bit. I know we are the Regina WINDY flyers but the wind out there today is a bit too windy. I want to thank all the volunteers, including myself, who helped get rid of the weeds on the runway, it is a big job. By getting rid of the weeds, we uncovered some what I think are really large cracks, if you had a large plane with large tires, it is not too much of a big problem. If you have a small plane, look out, you might loose it. Well, not literally loose the entire plane, but you get my meaning. We will have to do something about it soon.

I hope the funfly was good, also hope the turnout was good. I heard we had some flyers from MooseJaw and Saskatoon. that's great. It's nice to see people from other clubs come to ours and have some fun, that is what it's all about.

I will see you at the meeting this month at the field, again, I hope to see a good turnout.

Good flying as well as safe flying.
Craig Hooper, President RWF.

I forgot one more item. A great big good luck to Henry and his team of racers in Germany. I hope they do well as well as have fun. Go Henry Go!!!

Basics Electrics of Electric Flight

I'm trying to write down all the good stuff about electrical powered flight which other people have taught me, so that it might be useful to others coming into the hobby. So without further ado:

Electrical Basics
When it comes to our electric flight there are four things we typically think about:

Voltage	Current
Power	Capacity

As you probably know there are other electrical things that you might normally measure, like resistance etc, but we don't normally need to worry about them for electric flight.

The easiest way to think about all these things is to imagine electricity as water.

Voltage is electrical "pressure". It is measured in volts (v). Thinking of it like water, voltage is the number of metres of pressure you have - so if the reservoir is 50 vertical metres above you, you have 50 metres of pressure.

Current is electrical "flow". It is measured in amps (A). Thinking of it like water we would measure it in something like litres per minute.

Power is the combination of voltage and current (power = volts x current). We measure it in Watts (w). This is easy to imagine with water as well. Think of one of those huge water wheels - the kind that were used to power saw mills in times gone by. Now imagine hitting it with a super soaker water pistol. Even though the water is at very high pressure, there is very low flow, and so the super soaker will probably not generate enough power to turn the wheel. Now imagine the gently babbling stream that feeds the wheel, and under the force of almost no pressure, but with a high enough flow rate, generates enough power to turn the wheel. Finally imagine the fire hose - the best of both worlds - high pressure and high flow rate - it would probably make the wheel spin quite quickly.
Capacity is a measure of how long you can draw a specified current from a battery. It is measure in Amp Hours (Ah), or more commonly for the scale of equipment used for electric flight, mill-Amp Hours (mAh). Using the water analogy this is simply how many litres you have in your reservoir. It is a little more complicated for electrical power and we will talk about it a bit later.

How Much Power Do You Need to Fly?
To figure out the power you need to fly a model depends on the weight of the model, and the type of model it is, as well as what you want from it.

In one of those quaint exposures of the inadequacies of the Imperial measures system which the US still cherishes this is normally expressed as Watts (a metric unit) per pound (an imperial unit). For those that want to work with a measurement system that makes sense, one pound equals approximately 450g for the numbers below.

50-70 Watts per 450g - Minimum for reasonable performance flight. Slow flyers and slow park flyers
70-90 Watts per 450g - Slow flying scale models, Trainers.
90-120 Watts per 450g - Sports aerobatic. Fast scale models.
120-150 Watts per 450g - Advanced aerobatics. High Speed Models. Excellent Vertical performance
150+ Watts - Very High Speed, Unlimited Vertical Performance.

Note - You must include the weight of all the plane's components in your calculations - anything that leaves the ground with the plane needs to be included - batteries, the engine, speed controller, etc.

So, if you have a 900g delta wing, that you want to have unlimited vertical performance, you are going to have to try and generate 300w (900/450 = 2, 2 x 150 = 300).

If you have a slow flying scale plane that weights 350g then you need to try and generate a minimum of 54 watts (350/450 = 0.77, 0.77 x 70 = 54).

Understanding the Limits of Your Equipment
Most electrical equipment will have limits on the amount of current it can handle, as well as sometimes the number of volts it can handle. Some equipment also states a power limit as well.

Batteries, and particularly the Lithium Polymer type, are rated in C for the amount of current they can discharge. So, if you have an 800mAh 20C battery the maximum current you can draw from it is 16A (20 x 0.8=16). With the battery's volts in hand (say a 3s 800mAh rate at 20C) you can generate the maximum power this battery can provide - 16A at 11.1v = 177watts. Batteries may have a burst rate, and a continuous rate - so 15C at burst, 10C continuous. Using the 800mAh battery again you might be able to draw 12A in burst, but only 8A continuously.

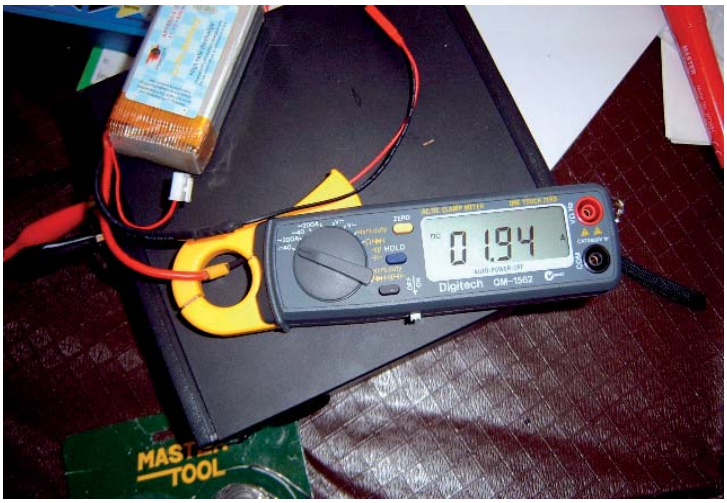
Speed Controllers are often rated by the amount of voltage, and current they can handle. The amount of current that is drawn through the speed controller depends on the engine. In general you need to make sure your speed controller can handle at least as much, and ideally a little more current and power than the engine. Obviously your speed controller needs to be rated at the voltage for the battery - it will not reduce voltage either (there isn't room for a transformer there).

Engines are usually rated at the maximum current draw they can handle. They will often have a burst and continuous rating. Sometimes engines are also rated for the maximum power they can handle. For example, and engine might say 18A or 200watts. This engine could handle a three cell LiPo (11.1v) @ 18 A = 198watts, but couldn't handle a 4 cell LiPo (14.8v) @ 18A (266watts). However, if you restricted the throttle so that the current never got above 13.5 A you could use a 14.8 volt battery with the motor (provided the motor can handle 4 cell LiPos).

How Much Current Does An Engine Draw
The current an engine draws depends on the propeller it spins and gearing. Generally if you buy a new engine information on propeller combinations, and how much current they draw will be included.

If it isn't, and you can't find it on the Internet, or you want to experiment with a different propeller then you really need a way to measure the current flow to make sure the engine is not drawing too much current for either the battery, the speed controller, or the motor.

If want to measure your current draw you will probably find that most cheap multimeters will only do 2 or 3 amps. I use a clamp meter, where the clamp is placed around the positive lead from the battery, and the current is measured through magnetic inductance. This has the big plus of being a lot less hassle (because you don't have to connect the metre in series) and a lot safer (as you aren't messing around with bare wires). Can strongly recommend a clamp metre if you are into this stuff.



Propellers with a larger diameter will draw more amps because they are moving more air. Propellers with a more aggressive pitch will draw more amps to a point, although the best pitch for a propeller is normally determined by how fast the engine spins (the kv rating for brushless engines - 1000 of rpm per volt).

There are two ways to reduce the amps a system draws - reduce the prop size, or limit the throttle throw if you have a computer radio.

A note on props
Props have two ratings, and by now you have no doubt figured out the first number is the diameter in inches. The second number is the pitch. What this number actually represents is the number of inches that the propeller would advance through the air in one rotation assuming no slippage.

Choice of propellers can significantly change the way an aircraft behaves. For example. A big propeller will give your aircraft a lot of thrust, and allow it to reach

top speed very quickly, but top speed will be quite limited. A smaller prop will take longer to accelerate, but will have a higher top speed. Which prop you need depends on application. For a 3D model typically you are after thrust and quick acceleration. If you are building a war bird, you will probably favour higher speed at the cost of acceleration.

A few more thoughts on batteries
Flight times and capacity

If you know how many amps your model draws whilst "cruising" it is pretty easy to estimate an approximate flight time. For example, if you have an 800mAh, which draws 8A while cruising you will have an approximate flight time of 6 minutes (800/8000(8A)=0.1 of an hour, or 6 minutes).

Our model of imagining a battery as a reservoir of water holds pretty well for a lot of examples, but not under all circumstances. For example, given two batteries - a 2 cell 1200mAh LiPo, or a 3 cell 800mAh LiPo, which would provide the longest flight time.

The answer is perhaps not as simple as you might think. Because the 3 cell has higher voltage you do not need to draw as much current to achieve the same power.

Let's say you need 30watts to cruise your light parkflyer:

For the 3 cell: power = volts x current therefore 30 = 11.1 x A, A =30/11.1, A=2.7
For the 2 cell: power = volts x current therefore 30=7.4 x A, A=30/7.4, A=4.1

So, flight durations are as follows:
3s 800mAh: (800/2700=0.3 of an hour, or about 18 minutes)
2s 1200mAh: (1200/4100=0.3 of an hours, or about 18 minutes)

So, even though the 2 cell has higher capacity, because the current draw is so much higher to provide the same power, it ends up both these batteries have about the same flight time.

A Guide To Electrics for Nitro/Glow Heads

This one seems to come up a little bit as Nitro flyers look for a bit of assistance in understanding electrics. So, here's an attempt to provide some assistance. Now please understand - if you are looking for an exact answer to whether a KERJKER34 works with a 384HED you aren't going to find it here - all I'm trying to do is explain the concepts so you "get it".

Now, as a Nitro flyer you know almost everything you need to grasp electric flight - in many ways it isn't that different.

Before starting here go take a look at the Basic Electrics of Electric Flight. It may seem a little like goobeldy gook on the first read, but once you have read that come back here and hopefully by the end some of it will start making sense.

Okay, without further ado let's get into it.

Inter related nature of the Power System
In a nitro/glow model the power system is pretty much defined by one component. The engine - once you have defined that most other characteristics naturally flow from it. For example, while varying the fuel payload will change the flight performance of the model somewhat, it won't change the power output of the engine.
This is probably the biggest difference with electric powered flight. It is a combination of the battery, motor and propeller that you choose which defines the power output. So, you can't quite approach the problem from the "this is a .4 size model" perspective anymore (well, you can actually - eflite for example make a range of glow replacement engines - of course you need to choose the correct battery to team with it, otherwise you won't get the correct amount of power output).
How do they interrelate? Well, I'm glad you asked (hello to fans of the Curiosity Show).

The speed the motor revolves at is defined by:

1. The number of volts supplied by the battery.
2. The revs per minute per volt (or kv) rating of the motor.

The amps drawn by the system is defined by:

1. The size of the propeller (bigger prop - more amps, smaller prop - less amps).
2. The speed at which the propeller rotates (which was defined above).

Once you know the amp draw you need to:

1. Make sure every component is rated for at least that many amps.

Finally, the total power output of the system is defined by:

1. The input volts from the battery; multiplied by
2. The number of amps the propeller draws.

Now - on first glance that might seem a little tricky, but just go back and read through it once more. Each relationships is defined. Hopefully some of the explanations below will help further.

Infinite Possibilities

Okay - infinite is an awfully big number - probably not infinite, but there are a lot variations you can do with electric power. This flexibility often appears to be complexity to those first looking at electric power.

Understanding where a power system delivers

Watts = volts x amps - no doubt you are starting to get sick of seeing this, but you need to understand what this means in application to “get” electric flight.
Why? Why am I labouring the point so much? Because there are many ways in which you can get the power you need to fly your aircraft. And this is where the true elegance of electric powered flight comes through.

There are three ways you can vary the power output of an electric flight system:
If you keep your battery voltage and motor kv constant then:

- Increasing the prop size will deliver more power (by drawing more amps).
- Reducing the prop size will deliver less power (by drawing less amps).

If you keep the motor kv and prop constant then:

- Increasing the battery cell count will deliver more power (by providing more volts and drawing more amps {because the motor is spinning faster with higher voltage}).
- Reducing the battery cell count will deliver less power (by reducing the input volts and drawing less amps {because the motor is spinning slower with lower voltage}).

If you keep the battery and the prop constant then:

- Using a motor with a higher kv will deliver more power (by drawing more amps).
- Using a motor with a lower kv will deliver less power (by drawing less amps).

Let’s say you decided you needed 150watts to make your plane fly the way you want it to (see the basic electrics of electric flight for info on figuring out the power requirements of your model based on its weight).

So how do you get to your power. The beauty of electric flight is that it can tailor to meet your other requirements with a great deal of flexibility.

For example, let’s say you have a scale model and you don’t have much room to spin a propeller when she is on her undercarriage. Starting from the prop size as the design input you could choose a motor and battery combination that will deliver the power you need.

Likewise you might have a 3d plane that needs lots of thrust - you will want to spin a big propeller - the biggest one you can. Once again - this can be a design input in choosing the other components.

Or maybe you just already have a battery and motor you would like to use. In this case, you can choose a prop that you know wont overdraw any of the components.

Defining Your Power System

When you are first getting into it, it probably pays not to get too adventurous. Many electric motor manufacturers will tell you a good combination of propeller and battery to use with their motor. Provided that none of their requirements are outside your plane’s limits (so you can swing that size prop, the battery will fit etc) then that is probably the best way to start.
If your motor manufacturer doesn’t give you the info then use online forums like www.rcuniverse.com or

www.rcgroups.com - people here will be all to happy to tell you combos that work.

There some more great info on wattflyer on choosing power systems.

System Limits
Finally - I know it is alluded to elsewhere, but just to touch on it again - you can't just go on drawing more and more amps. Components are usually rated in terms of continuous amps they can provide (for batteries there is a C rating - multiply the battery's capacity by this to get its constant discharge limit - for example 2200mAh 10C battery is 22Amps maximum continuous).

If you can't measure your amp draw you need to be very careful about overtaxing your components. It is best to rely on tables provided by the manufacturer about combinations that work.

In terms of damage - it tends to be a little like this:

- Speed Controllers just tend to cut out when you try and put too many amps through them - the speed controller is safe - the rest of the model is in peril because you have no power.
- Motors will tend to take some abuse, but eventually the high temperatures will damage the magnets that make the motor work, and power versus input volts and amps will drop off.
- Batteries - LiPo and LiIon can be permanently damaged by even one session of overdrawing current from them - they are often the most expensive components and so they are probably the ones to be most careful with. NiMh and NiCd don't suffer from this but have their own issues.

Conclusion
There is still quite a bit more to know about this stuff, like going for pitch speed versus thrust etc. On the right hand side the RC articles link has some more stuff you might find handy.

http://www.ozrcflying.com/2007/09/guide-to-electrics-for-nitroglow-heads.html

TEN POINTS ON FLYING FIELD ETIQUETTE:

#10 - Always offer a woman pilot the flight station without the Fire Ant mound.

9 - Always inform the other pilots of your intentions, your intention to takeoff, your intention to land, and your intention to make a big crater in the middle of the runway (it's always hard taxiing around those fuselage tails sticking out of the ground).

8 - When walking up to the runway for a landing, it is impolite to walk between two people using a buddy box.

#7 - It's considered bad manners to yell at someone who's been tying up the runway, even for a substantial length of time. After all, that's what water balloon bombs are for.

6 - It is the ultimate in bad manners to run over someone else's plane when backing out of the parking lot, unless that plane is the only one with half a chance at beating you in the next contest.

5 - In Europe, it's considered the height of poor taste to groan, cry out, or make any noise at all when a fellow flier crashes a plane. In this country, an air-horn blast is just barely considered rude.

4 - If a fellow flier should be unfortunate enough to seriously injure himself at the field, common courtesy demands that you should lend any assistance necessary, such as helping him Super Glue the forty-two inch long gash on his forehead together, so he can get back to the serious business of flying.

3 - If your aircraft goes out of control, it is polite to warn other pilots of the fact by calling out "HEADS UP!". Diving under a table and yelling "YOU'RE ON YOUR OWN, SUCKERS!" is not considered appropriate behavior.

2 - It is not only rude but against club rules to buzz the pits, the road, or the parking lot. On the other hand, the guy mowing the lawn is always fair game.

1 - Always be considerate and patient with a beginner pilot who comes to the flying field with a trainer. Someday he'll be a reckless egotistical bastard, just like you.

Regina Windy Flyers Meetings

July 27	RWF Field (weather permitting)
August 31	RWF Field (weather permitting)
September 28	Cathedral Neighborhood Centre
November 30	Cathedral Neighborhood Centre

Saskatchewan Events

(from MAAC website)

July 25, 2009 SWIFT WINGS RC FLYING CLUB INC
Spad Wars
All Spad enthusiasts, Swift Wings will hold a weekend of Spad combat, fun flying and Spad pylon When: July 25 & 26, 2009 Where: at Chase Field / Skyline Park is the place. Contact Arthur Hare at (306)773-7414 email: ahare@shaw.ca Free camping is available

August 16, 2009 SWIFT WINGS RC FLYING CLUB INC
Air Show
August 16, 2009 Swift Wings R/C Flying Club will be holding their semi annual AIR SHOW. All flyers wishing to demonstrate their favorite bird are welcome and most appreciated. The place is Chase Field in Skyline Park, 7 km north on Hwy # 4 then 3 km west on Skyline road. Show will be from 1:30 pm to 3:30 pm Sunday. For further information, contact Glen Chase at (306) 773-1436 or glen.c@sasktel.net

August 22, 2009 HUB CITY RADIO CONTROL CLUB INC
Saskatoon Pylon Race Weekend
Pylon Race Weekend The Hub City Radio Control Club of Saskatoon hosts their annual pylon race meet on August 22 and 23, 2009. Registration until 8:30 a.m. each day (MAAC or AMA membership required). Quickie 500 and Sportsman 500 run on Saturday, with racing starting at about 9:30 a.m. Quarter 40 racing will commence on Sunday at 9:30 am. Novice pilots and those from out of the CPPRA race district are welcome. Quickie 500 and Quarter 40 are CPPRA 'points' races with airframe and engine rules enforced. Sportsman 500 is geared towards the novice racer and allows any quickie 500 racing aircraft and any sport .40 CID engine (excludes specialized racing engines). Spectators welcome. Concession on site. Camping available. For info on flying site location visit hppt://www.hcrcc.org and for racing information contact Richard Moldenhauer at (306) 242-7102 or rmoldenhauer@shaw.ca

September 5, 2009 PRAIRIE FLYERS
Float Fly
Fairview Dam Float Fun Fly. September 5-6-7, 2009. Location: from Elrose on Hwy # 4, travel 23 km west on Hwy # 44, turn south, travel 3 km to Fairview Dam sign. Turn right and follow road to dam and camping site. Bring your trailer and enjoy free camping and good float flying!