The Flightline

Volume 45, Issue 9 Newsletter of the Propstoppers RC Club AMA 1042 September 2015

President's Message

The flying season will soon be coming to an end. All of the picnics were great.

We have one event left; Sept 26th with the church starting at 3:00 till dark. We will have a candy drop at a time to be set at the meeting. We should also plan to demonstrate flying with different models, so please volunteer. If you won't be at the meeting please call or email me.

Probably cancelled. See the note below

The monthly meeting will be inside at the Church meeting room, so bring some show & tells. By all means fly before hand; make the most of the fall weather.

Nominations for the board will be coming up in October. Candidates must be a member and have an AMA membership.

See you at the meeting with show & tells

Dick Seiwell, President

Minutes of the Propstoppers Model Airplane Club

Since the August meeting was cancelled due to weather there are no minutes to report.

The Pope's Visit to Philadelphia

Shut Down! No Flying Saturday 26th and Sunday 27th

http://thehill.com/policy/transportation/251554-faa-bans-drones-for-papal-visit

The agency said it is issuing the ban for Sept. 26-27 at the request of the Department of Homeland Security in an effort to "provide a safe and secure environment for the event but also ensure fair and equitable access to all airspace users to the greatest extent possible" for Pope Francis' Philadelphia visit

The agency said the flight restriction will cover "Model Aircraft, Unmanned Aircraft (A.K.A. Drones), Aerobatic Maneuvers, Glider Operations, Parachute Operations, Ultralights, Lighter than Air/Balloon/Moored Balloon, Agricultural/Crop Dusting/Spraying, Animal Population Control, Banner Towing, Utility/Pipeline Patrols, Aircraft/Helicopters operating from a ship or private/corporate yacht, Model Rockets, or Maintenance Flights, Flight Training, and Practice Approaches are prohibited – including DOD, Law Enforcement and Air Ambulance."

The full flight restriction advisory notice can be read **here**.

Agenda for September 8th Meeting At
At the Church Room, CA Field
Meeting 7pm till 8:30?

1. Show and Tell
2. Membership Report
3. Finance Report
4. Club Calendar Review
5. September Church Event planning

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Calendar of Events

Club Meetings

Monthly Meetings
Second Tuesday of the month.
Gateway Community Church at the Christian Academy. Doors open at 7:00
Next Meeting; 8th September at Church Meeting Room

Tuesday Breakfast Meeting
Tom Jones Restaurant on Edgemont Avenue in Brookhaven. 9 till 10 am. Just show up.
Flying after in the summer at CA or Elwyn Field 10 am. Weather permitting.
Indoors at the Brookhaven Gym in bad weather 10:30-11:30 See dates allowable.

Regular Club Flying

At Old Christian Academy; Electric Only
Monday through Friday after school till dusk
Saturday 10 am till dusk
Sunday, after Church; 12 pm till dusk
At Elwyn Field; Gas or Electric
Monday through Saturday 8 am till dusk
Sunday 12 pm till dusk
INDOOR Flying, see attached dates.

Special Club Flying

Saturday mornings 10 am
Wednesday Helicopter evening in summer
Thursday evenings in the summer
Tuesday mornings 10 am weather permitting after breakfast.
Check our Yahoo Group for announcements;
http://groups.yahoo.com/group/propstoppers/

Beginners

Beginners using due caution and respecting club rules may fly Apprentice or similar models without instructors at Christian Academy Field.
The club also provides the AMA Introductory Pilot Program for beginners without AMA insurance.

Propstoppers RC Club of Delaware County, Pennsylvania.
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Another Fine Picnic

Superb weather and a fine turn out made for an excellent August picnic. President Dick Seiwell provided hoagies with fixings and drinks for everyone and of course Tina Kime provided her Pink Stuff with its secret ingredients.

In addition to the usual airplanes some of the guys are flying mini quads with First Person Video setups.

Here Murray Wilson tries out a headset during a flight by Chris Maruzzi, shown above.

Jeff Frazier launches Fran Misantone's EDF glider, bit of a handful this time. Visited the trees and then retrieved. Flies fine now.

New member Joe Guardino brought a collection of EDF jets.

More Club Flying in August

Elwyn Field is getting a regular morning turn out all days of the week but especially after the club breakfast on Tuesdays.

Here Dick Bartkowski is showing Murray Wilson his Old Timer Spook with a pre-war Ohlsson 60 spark ignition engine. This model is set up for the SAM completion events and Dick has been sorting it out for a contest at the AMA site in Muncie Indiana in September.

The model was built by former long time club member Ed Goretzka.

The Candy Bomber is getting a check out prior to the September scheduled flying event for the Gateway Church picnic.
This model was donated by Al Tamburro last year and fitted out with the bomb bay and propulsion system by your editor. It was a bit of a handful but did the job.
I couldn't remember the prop and battery used last year so I did a quick MotoCalc check and selected the prop and battery for the test at the picnic. In the event the power turned out to be inadequate and although it achieved flight there was insufficient power to maintain altitude during the downwind turn and it ploughed in.

I have written about the very poor structural design of the Telemaster and this one turned to sticks from the wing leading edge to behind the trailing edge.

You know how it is; First the crash, then the long march with the bits back to the car in front of the crowd of rail birds.

Then you leave it in the car wondering if you will bin the parts…

Then you have to clear it out of the car and notice a couple of matching jagged sticks.

Then you take it to the workshop where you notice more jagged sticks and try to fit a pair together . If they fit you might reach for the CA. Wow, there are a few more bits that fit, almost enough to join the halves together.

Then you take a brake and marvel at the stupidity of the designer, and remember you wrote an article about that very thing. Before you know it you are fitting and gluing and wondering how you will align the two halves.

Then you realize that key longitudinal bits have broken and are missing.

Then you think about scarf joints and hit the wood bin which happens to be near the bandsaw. Parts fly and are test fit.

Yikes, most of it is back together with a few structural improvements.
So many glue joints, so few clamps and clothes pins..

Time to let the glue dry. Take a picture and call it a night…. Sorry about the background, but there you are the only available bench space. All the others are taken up with a real model repair…..

Well, the repair was competed and a better prop selection resulted in double the power of the last flight attempt. So back the field, this time Elwyn, for another test flight. The flying qualities were still a handful but power adequate.

The Telemaster along with the Piper Cub and many other airplanes suffer from adverse yaw in maneuvers; When you input left roll aileron to initiate a turn to the left the airplane rolls left but yaws right and might not turn at all.

You can correct this with rudder input or even couple the rudder to the ailerons (as the Wright brothers did) The better way is to set up the ailerons with differential travel; you want the up travel to be greater than the down. Indeed in the extreme you may have the ailerons only go up on one side and stay level on the other. Of course you can use coupled rudder too.

Well the trouble (s) with this particular model is the ailerons are small and the way they have been mounted limits travel. So after a harrowing flight some fixes were made; the ailerons were extended and the controls reprogrammed to incorporate the desirable differential travel. This worked as a fix and the ten pound model was now controllable!

Can't wait to do some bomb runs. Yes, they need to be practiced too as last year we matched the Allies WWII bombing accuracy with two complete misses (candy in the trees) and one near miss; candy in the long grass. Still, the kids were thrilled, so let's see if we can nail it this year.

On the left Matt Borden with his two big helicopters at Christian Academy Field. Yes I know "no gassies" at CA but Matt had flown the gassie on the left at Elwyn before coming to CA to fly the electric on the right.

Below is Bert Moses with his EDF F-35 at Elwyn. Bert is in the process of joining the club. He is a long time friend of Eric Hofberg's. They flew together in the Chester County club years ago. Welcome Bert.

Meet Garrett Rice

After attending the Institute of Far Eastern Languages at Yale University, I served as an airborne mission supervisor in the USAF, flying over 300 combat missions and 3,000 hours in Southeast Asia and elsewhere.

After discharge, while attending Temple University, I starting learning to fly at Wings Field. Ended up getting all the ratings – commercial, instrument, multi-engine, and certified flight and instrument instructor. Eventually qualified as a Gold Seal Flight Instructor.

Did some flight instructing and charter flying until I got a job selling Beechcraft for the Northeast distributor. That was a great 10 years, blasting around in new Bonanzas, Barons, Dukes, and King Airs – making more money and having more fun than a dumb hot rodder from California had any right to expect. Then the market collapsed in the 80's.

After that, I spent a number years as chief pilot and sales engineer for a steel foundry.

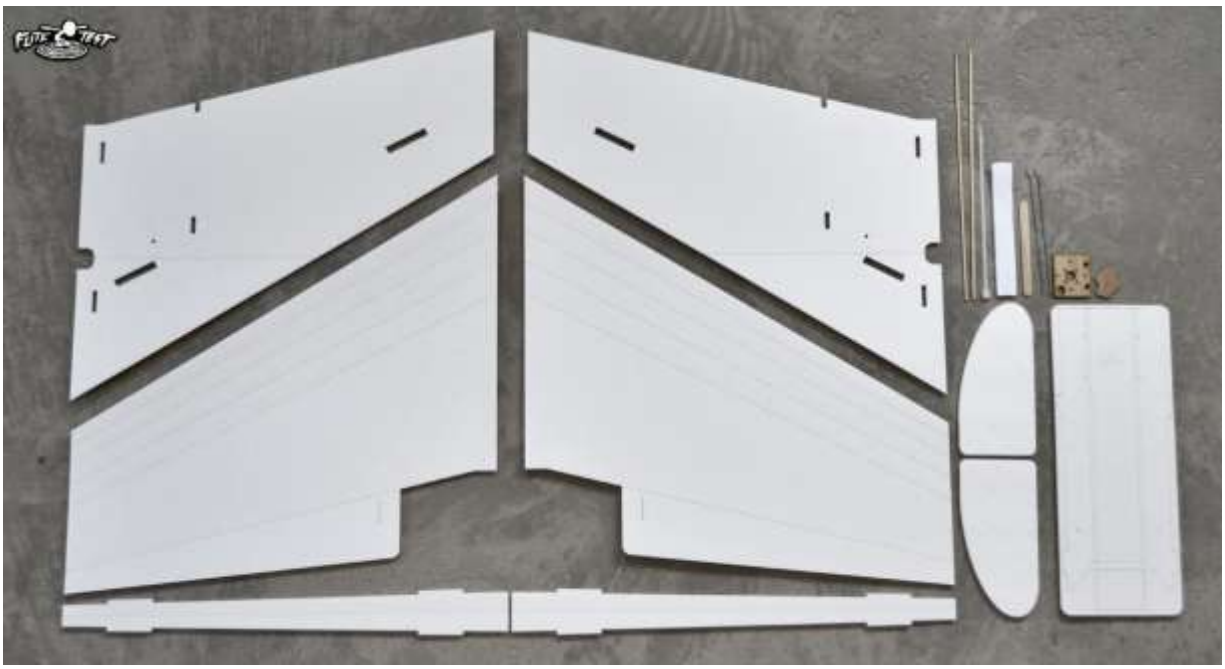
I have over 15,000 hours in the air and, by a rough count, have had the opportunity to fly, at one time or another, around 60 different aircraft types. Never so much as scratched the paint – which is a lot more than I say for my RC experience to date.

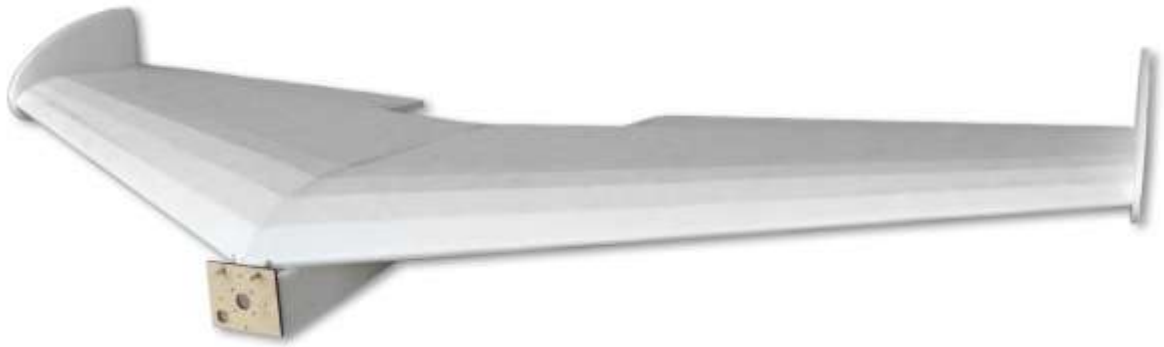
Despite earning my new sobriquet "Lawn Dart", it's been very enjoyable getting to know some of the members of Propstoppers and digging into the intricacies of a new hobby.

Garrett

Report from the Cape

My August news is sparse, but I hope enjoyable. My latest scratch build is the ***Flight Test Versawing.*** This is their medium sized delta wing known for great performance and a wide flight envelope. It is capable of very slow "walking speed" flight and has also been clocked at over 100 mph. It is also a very serviceable slope soaring model.





My maiden flight, shown in this video, demonstrates its gentle characteristics and elegant looks. Already, three other members of the Crosby Beach crew have built their own after seeing mine fly. It will be a first scratch build for two of them.

I hope you enjoy the video. It includes another first for me, air to air video taken by one of the guys with his new FPV quadcopter. *(Editor's note to CA Field quad flyers; how about some aerial video of our models?)*

http://youtu.be/C1eQOovDGeM

I look forward to returning to Pa in early October. Hopefully I will get in some significant field flying, with an actual runway, before we are forced indoors.

Regards to everyone,

Larry

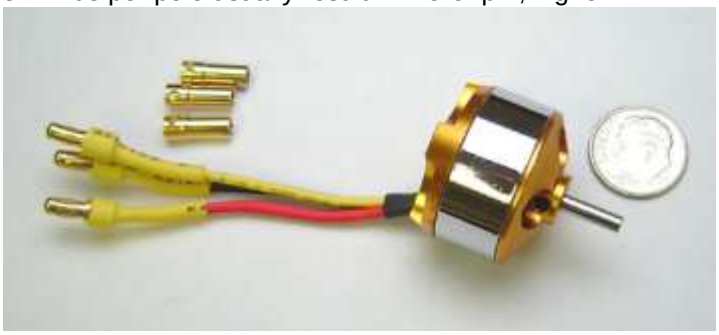
Some Information on Electric Propulsion

I often get questions from members new to electric power regarding motor, battery and propeller selection. These may be about a completely new project "what motor should I buy" or about upgrading an existing model, or even using an existing motor in a different model. So here are some insights, practices and physics of the problem. I will address these to outrunner motors as these are the most common nowadays.

First the bits you probably understand; the motor consists of an electro magnet stator and a permanent magnet armature like those shown here. The geometry, windings of the stator and material of the magnets determine its characteristics in terms of rpm, torque and thereby power.

Motor designations frequently use the form of stator diameter and length and the number of windings per pole.

Here is a motor from BP Hobbies with such designation; A2208/14. This motor has a stator diameter of 22 millimeters and length of 8 mm with 14 winds per pole. Fewer winds per pole usually result in more rpm, higher current and higher power.



These mechanical properties beget the parameters that define the motor technically;

Kv, the rpm per volt

Io, the idle current in Amps

Rm the windings resistance in Ohms.

From these parameters you can calculate the performance with different batteries ESCs and propellers. If you buy a "no name" motor without these numbers you are on your own!

I will show you how to use them in calculators a bit further on.

No. of Cells:	2 - 3 Li-Poly
Kv:	1450 RPM/V
Max Efficiency:	80%
Max Efficiency Current:	5 - 9A (>74%)
No Load Current:	0.6A @10V
Resistance:	0.140 ohms
Max Current:	12A for 60S
Max Watts:	133W for 60S

Propeller:	Volts (V):	Amps (A):	Thrust (g/oz):	Power (W):
APC 7 x 5 E	11.8	12.9	19	152
APC 7 x 4 E	11.9	11.2	18.8	132
APC 7 x 4 SF	11.7	12.2	18.90	143
APC 6 x 5.5 E	11.7	9.5	11.3	111
APC 8 x 4 E	8	8.5	14.7	68
APC 9 x 4.7 SF	7.8	12.6	18.3	98

Note there are two other important elements here; the operational limits expressed in terms of maximum current; Amps, and maximum power; watts, for 60seconds. These are related to the thermal limits which exist in all motors. They are associated with the material temperature limits of the magnets and stator winding insulation. Exceed the temperature limits and your magnets get permanently weak or the stator windings dead short letting the smoke out! These thermal issues arise from the inefficiency of the particular motor at the particular operating condition. Note this motor could operate as high as 80% efficiency but that means 20% going to heat and the heating continues as you operate the motor; hence the specification for a 60 second limit.

Let's just take a minute to relate flying our models to the electrical side of things in terms of power. Experience leads us to the amount of power necessary to fly different types of models. It is easy to relate them in terms of power per pound of model weight. The charts below help you select the power you require and thereby the battery and current the motor must pull to achieve this power level. First one simple formula;

Power = Volts x Amps in watts (1 Horsepower = 746 watts)

Model Power Required ~ Watts				
Model Weight Lb.	**Minimal Slow Flyer**	**Sport Flyer**	**Aerobatic Fast or 3D**	**Ultimate Vertical or Very Fast**
0.5	12	25	50	100
1.0	25	50	100	200
1.5	38	75	150	300
2.0	50	100	200	400
2.5	63	125	250	500
3.0	75	150	**300**	600
3.5	88	175	350	700
4.0	100	200	400	800
4.5	113	225	450	900
5.0	125	250	500	1000
5.5	138	275	550	1100
6.0	150	300	600	1200
6.5	163	325	650	1300
7.0	175	350	700	1400
7.5	188	375	750	1500
8.0	200	400	800	1600

For example from these charts; If we have a three pound model and want it to have excellent 3D performance we see from the chart we need 300 watts. Go to the next chart and see there are three choices of battery voltage and associated current to achieve that power.

Power			
Cells	**2**	**3**	**4**
Volts	**7.4**	**11.1**	**14.8**
Amps			
5	37	56	74
10	74	111	148
15	111	167	222
20	148	222	**296**
25	185	278	370
30	222	**333**	444
35	259	389	518
40	**296**	444	592
45	333	500	666
50	370	555	740
55	407	611	814
60	444	666	888

Now we know all motors have a characteristic Kv; rpm per volt. So our example battery choices; 2 cell, 7.4 volts, 3 cell, 11.1 volts and 4 cell, 14.8 volts, used on a particular motor would result in three very different rpms. If the two-cell produced 5,000 rpm then the three would try to produce 7,500 rpm and the 4 cell, 10,000 rpm. I said try because if you tried to do it with the same propeller you would certainly melt the motor. Here is why;

The power required to turn a propeller varies as the **cube of rpm**. With the same propeller jumping from the **two cell to the four** the motor tries to double the rpm. ***So the power required is 2 x 2 x 2 = 8 times***

(Going from a two cell to three cell increases the power required by 3.4 times)

If you chose a prop with the two cell that pulled 40 amp and took 296 watts to drive it, substituting the four cell would, in theory, drive the current to; ***40 x 8 = 320 amps and almost 5 kilowatts ~ 6.3 Horsepower;***. Enough to weld one inch steel plate.

Of course the motor would burn out almost instantly, hence the theoretical performance.

If you had a good reason to use a four cell battery with this motor you would need to reduce the propeller diameter to yield the 20 amps load and stay within the 300 watt limit.

Now the power required to drive a propeller at a given speed and **changing prop diameter** varies by the **fourth power** so a ***10% increase in diameter increases the power required by 1.1 x 1.1 x 1.1 x 1.1 = 1.5 a 50% increase.***

Likewise a ***10% decrease in diameter reduces the power required by about 1/3***

Powerful stuff eh? So, if you feel like playing with number of cells and propeller size on one of your projects, do so carefully as you could end up sorry you fried your motor, ESC or battery. ***(Don't let the smoke out!)***

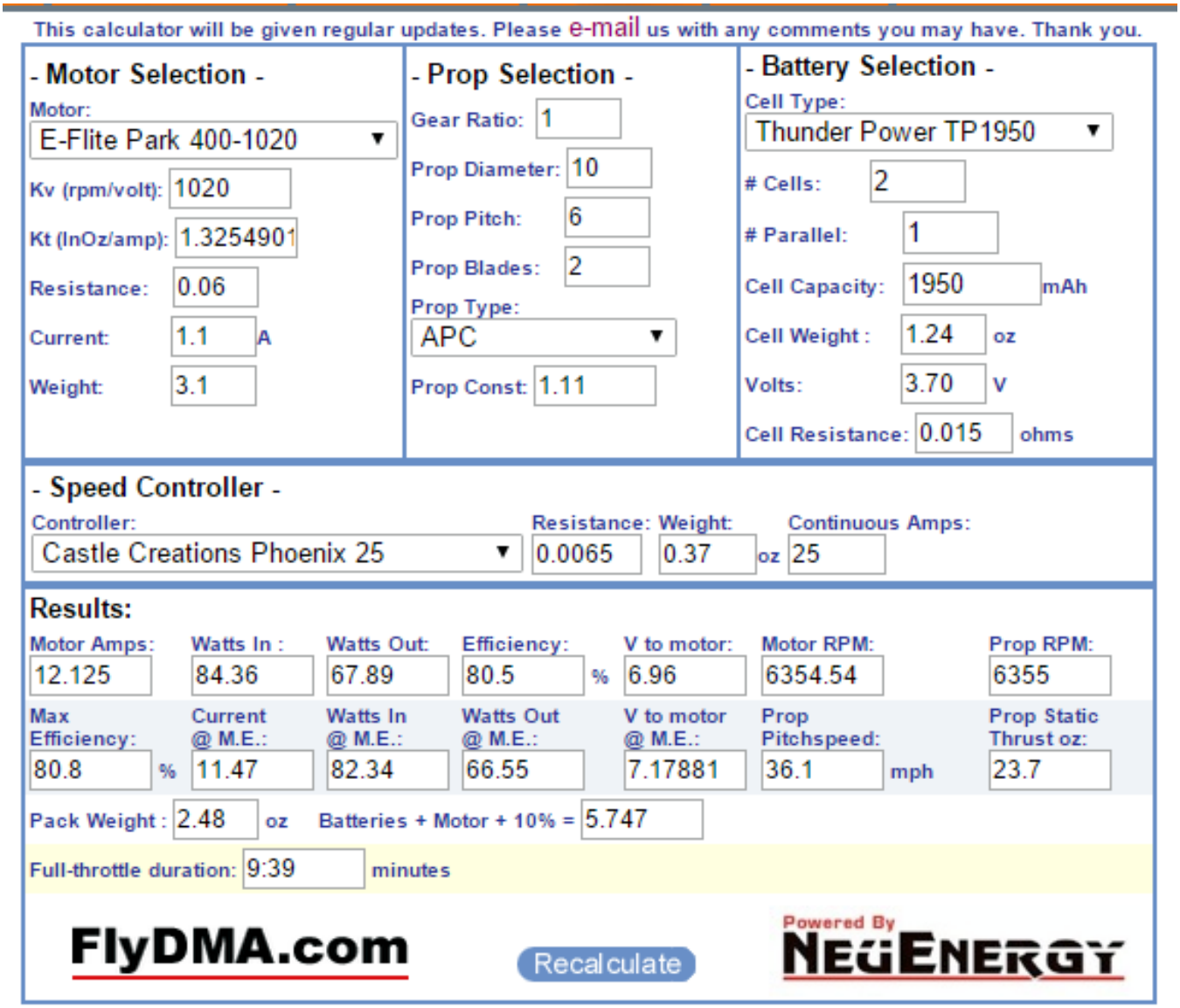
If you think you will be in the hobby for a while and enjoy playing with various motor battery and props invest in a Wattmeter. This is a device you insert between the battery and the ESC (on the ground) to measure the current and power with a given battery and propeller. This will tell you the starting point from which you can experiment.

http://www.hobbyking.com/hobbyking/store/__14624__HobbyKing_PO_Wattmeter_100A.html?strSearch=wattmeter

The other thing you might try is to calculate the motor and model performance before you buy and / or try. There are at least two great ways to do this. First there are online motor / prop / battery calculators;

http://brantuas.com/ezcalc/dma1.asp

http://www.ecalc.ch/motorcalc.php?neumotors&lang=en



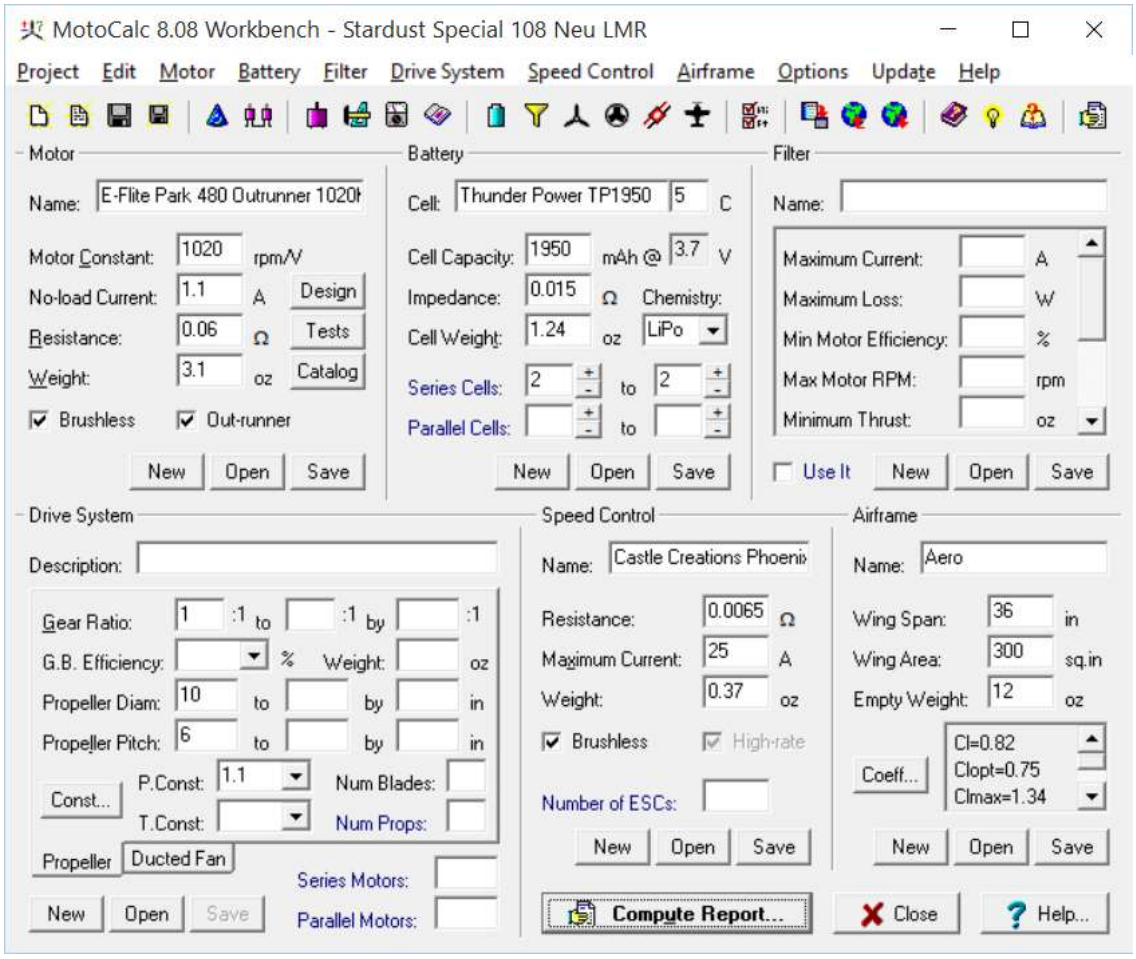
These calculators include libraries of motors, propellers, batteries and ESCs in sufficient detail to enable these calculations. You can of course insert your own parameters, should the part you have not be in the library. Of course this is why I warned you about buying the “no name” parts.

Then the more advanced tool is **MotoCalc** where you not only calculate the motor/prop/battery performance but the resulting performance of your airplane too; speed, rate of climb, duration of flight etc. MotoCalc is free to try for 30 days then $39

http://www.motocalc.com/

This is the input page. The model is a nominal two pound sport machine with the same motor, ESC, battery and prop from the calculations on the last page from the online calculator.

Here is the predicted performance;



Motor: E-Flite Park 480 Outrunner 1020KV; 1020rpm/V; 1.1A no-load; 0.06 Ohms.
Battery: Thunder Power TP1950 (5C); 2 cells; 1950mAh @ 3.7V; 0.015 Ohms/cell.
Speed Control: Castle Creations Phoenix 25; 0.0065 Ohms; High rate.
Drive System: 10x6 (Pconst=1.1; Tconst=0.95) direct drive.
Airframe: Aero; 300sq.in; 18oz RTF; 8.6oz/sq.ft; Cd=0.093; Cl=0.82; Clopt=0.75; Clmax=1.34.
Stats: 72 W/lb in; 58 W/lb out; 13mph stall; 17mph opt @ 59% (62.35, 75°F); 17mph level @ 58% (61.55, 75°F); 882ft/min @ 35.3°; -172ft/min @ -6.5°.

Sea Level, 29.92inHg, 59°F
100% Throttle

AirSpd (mph)	Drag (oz)	Lift (oz)	Batt Amps	Motor Amps	Motor Volts	Input (W)	Loss (W)	MGbOut (W)	MotGb Ef(%)	Shaft Ef(%)	Prop RPM	Thrust (oz)	PSpd (mph)	Prop Ef(%)	Total Ef(%)	Time (m:s)
0.0	0.0	0.0	11.6	11.6	7.0	80.7	15.6	65.1	80.7	76.1	6347	16.6	36.1	0.0	0.0	10:07
1.0	0.0	0.1	11.6	11.6	7.0	80.7	15.6	65.1	80.7	76.1	6347	16.3	35.1	3.1	2.4	10:07
2.0	0.0	0.3	11.6	11.6	7.0	80.7	15.6	65.1	80.7	76.1	6347	16.1	34.1	6.1	4.7	10:07
3.0	0.1	0.6	11.6	11.6	7.0	80.7	15.6	65.2	80.7	76.1	6346	15.9	33.1	9.1	6.9	10:07
4.0	0.1	1.0	11.6	11.6	7.0	80.8	15.6	65.2	80.7	76.1	6345	15.7	32.1	11.9	9.1	10:06
5.0	0.2	1.6	11.6	11.6	7.0	80.9	15.6	65.3	80.7	76.1	6343	15.5	31.0	14.7	11.2	10:05
6.0	0.3	2.3	11.6	11.6	7.0	81.0	15.7	65.3	80.7	76.1	6342	15.3	30.0	17.4	13.2	10:05
7.0	0.4	3.2	11.6	11.6	7.0	81.1	15.7	65.4	80.7	76.0	6340	15.0	29.0	20.0	15.2	10:04
8.0	0.5	4.1	11.6	11.6	7.0	81.2	15.7	65.5	80.7	76.0	6339	14.8	28.0	22.5	17.1	10:03
9.0	0.6	5.2	11.6	11.6	7.0	81.2	15.7	65.5	80.7	76.0	6338	14.6	27.0	24.9	18.9	10:03
10.0	0.7	6.5	11.7	11.7	7.0	81.3	15.7	65.6	80.7	76.0	6337	14.4	26.0	27.2	20.7	10:03
11.0	0.9	7.8	11.7	11.7	7.0	81.3	15.7	65.6	80.7	76.0	6337	14.2	25.0	29.5	22.4	10:02
12.0	1.1	9.3	11.6	11.6	7.0	81.1	15.7	65.5	80.7	76.0	6339	13.9	24.0	31.6	24.0	10:04
13.0	1.3	10.9	11.6	11.6	7.0	80.8	15.6	65.2	80.7	76.1	6345	13.6	23.0	33.6	25.6	10:06
14.0	1.5	12.7	11.5	11.5	7.0	80.4	15.5	64.9	80.7	76.1	6351	13.3	22.1	35.6	27.1	10:09
15.0	1.7	14.5	11.4	11.4	7.0	79.8	15.4	64.4	80.7	76.2	6362	13.0	21.2	37.4	28.5	10:15
16.0	1.9	16.5	11.3	11.3	7.0	78.9	15.2	63.7	80.8	76.3	6377	12.6	20.2	39.2	29.9	10:22
17.0	2.1	18.7	11.1	11.1	7.0	77.9	15.0	62.9	80.8	76.3	6394	12.2	19.3	40.8	31.1	10:30
18.0	2.4	20.9	11.0	11.0	7.0	76.7	14.7	62.0	80.8	76.4	6413	11.8	18.4	42.3	32.4	10:40
19.0	2.7	23.3	10.8	10.8	7.0	75.4	14.4	60.9	80.8	76.5	6436	11.3	17.6	43.8	33.5	10:53
20.0	3.0	25.8	10.5	10.5	7.0	73.8	14.1	59.7	80.8	76.7	6461	10.9	16.7	45.1	34.6	11:07
21.0	3.3	28.5	10.3	10.3	7.0	72.1	13.8	58.3	80.9	76.8	6490	10.4	15.9	46.4	35.6	11:24
22.0	3.6	31.3	9.9	9.9	7.0	70.0	13.4	56.6	80.8	76.9	6523	9.9	15.1	47.5	36.5	11:46
23.0	3.9	34.2	9.6	9.6	7.0	67.6	13.0	54.6	80.8	77.0	6562	9.3	14.3	48.6	37.4	12:12
24.0	4.3	37.2	9.2	9.2	7.1	65.0	12.5	52.4	80.7	77.0	6604	8.7	13.5	49.5	38.1	12:43
25.0	4.6	40.4	8.8	8.8	7.1	62.0	12.1	49.9	80.5	77.0	6651	8.1	12.8	50.4	38.8	13:21
26.0	5.0	43.7	8.3	8.3	7.1	58.8	11.6	47.2	80.3	77.0	6702	7.5	12.1	51.2	39.4	14:08
27.0	5.4	47.1	7.8	7.8	7.1	55.3	11.1	44.1	79.9	76.8	6756	6.8	11.4	51.9	39.9	15:04
28.0	5.8	50.6	7.2	7.2	7.1	51.5	10.6	40.8	79.3	76.5	6814	6.2	10.7	52.6	40.2	16:14

Here is some data on the power required to turn a prop at a given rpm. Pick the prop of interest as a line on the chart then read **rpm** along the bottom and read off the **power** in watts on the left hand side. By the way, these are Aeronaut props we use in competition. They are very efficient. But the data will be close to the APC props many use.

Sorry about the graph scales. For the techies they are Log Log plots. We use them because the data often turns out as a straight line. But you must be careful in reading the scales!

The example shown in the red lines is for a 10 x 6 prop turning at 6000 rpm. You read off the power required as about 76 watts. Now remember that the motors are not 100% efficient and this is the power required at the prop, so the input power will be more to accommodate the losses. If we assume this motor at this operating point is 80% efficient then you need the input power to be about 25% more so about 100 watts.

On a two cell battery the input current would be

Power = Current x Voltage

So Current = Power / Voltage

Then Current = 100 / 7.4

= 13.5 Amps.

If this is too much information just use it for bedtime reading to put you to sleep☺

But don't let the smoke out, you have been warned.

Dave