



The Flightline



Volume 38, Issue 3

Newsletter of the Propstoppers RC Club

AMA 1042

March 2008

President's Message

Well the weather is getting better so let's get our planes ready to go. The fields should be good, just a little soft, so don't get stuck!

Don't forget the last indoor flying this Friday, 7th March at the Tinicum School.

I have signed the club up for another Middletown Pride Day May 10 rain or shine. Dave is working on some ideas for club projects for this year; how about some of yours? Have you renewed your club subscription yet? Bring your AMA card and a check for \$60 to the meeting or mail it to Ray Wopatek soon.

Please bring a show and tell item.
See you at the meeting.

Dick Seiwel

*Agenda for March 11th Meeting
At The Middletown Library;
Doors open 7pm, Meeting 7:30pm.*

1. Membership Report
2. Finance Report
3. Discussion of 2008 event plans
4. Show and Tell

Al Gurewicz

All clubs have a few members who toil at the essential tasks behind the scenes. Most organizations would not survive without them. For many years Al Gurewicz was such a person for the Propstoppers. Al left us last month on his way to that big flying field in the sky.

He was for many years our treasurer. He kept the books, dealt with the finances and the bank accounts paid the bills and faithfully reported his activities at every club meeting. He also arranged the meeting room and dealt with the Marple Newtown Library when we met there.



Those were the tasks assigned to the treasurer and Al did them well, but he did much more. Over the years we have held many early spring field fix-up days and Al was always there among the few that could be counted on.

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Calendar of Events

Club Meetings

Monthly Meeting Tuesday 11th March 2008
at the Middletown Library Doors open at
7:00 pm Meeting at 7:30

Tuesday Breakfast Meeting
The Country Deli, Rt. 352 Glenn Mills
9 till 10 am. Just show up.

Indoor Flying

At the Tinicum School Gym 6:30 till 9 pm
Friday March 7, 2008

Regular Club Flying

At Middletown / Sleighton Field

Monday - Friday;

10 am until dusk - Electric Only

Saturday

10 - 3pm-for FUEL PLANES and

10 - Dusk for Electric

Sunday - 12 - Dusk - Electric Only

At Christian Academy; Electric Only

Monday through Friday after school till dusk

Saturday 10 am till dusk

Sunday, after Church; 12 pm till dusk

Special Club Flying

Saturday mornings 10 am Sleighton Field

Tuesday mornings 10 am Sleighton Field

weather permitting after breakfast.

Beginners using due caution and
respecting club rules may fly GWS Slow Stick
without instructors.

I remember one year when we were still at Moore Field. The club had finally decided to remove the tree and copse sited on the downwind leg. This involved a good deal of brush removal together with some substantial bushes and one good sized tree. Of course when all this had been cut down the debris had to be removed. I couldn't stop Al, all 140 pounds of him, from carrying the tree trunk pieces to a pickup. Mind you, Al was about 80 years old at the time and there were some youngsters who could have done the work.

Al was a regular at the field on Saturday's up until the last few years. His favorite plane seemed to be a Goldberg Tiger. His orange and white, .40 sized, low wing didn't perform a lot of aerobatics, but always returned safely to fly another day. He enjoyed yearly jaunts to the Warbirds over Delaware fly-in and the Lebanon auction.

You could always find Al and his lovely wife Marie helping to make sure everyone had a great time at the annual picnic.

Al was one of that generation of men who served his country in the Big War. He modestly told me that since he was in transport support duty he didn't get near the fighting but of course Al was always modest. It turned out that he fought across Europe "behind the fighting".

I didn't see Al fly much during my time with the club but he very much enjoyed watching us fly and on occasion you could get him to take the sticks although more recently you stood alongside ready to help out.



A few years ago Al asked to be replaced as Treasurer as it was becoming a chore for him and shortly after he gave up driving so it was difficult for him to meet with us.

Those Propstoppers who have been around a while owe Al a great deal, as a club officer, a trusted helper and fine person to have around. He was a quiet leader who was always there whenever asked. He will be remembered as a gentleman and good friend.

Dave Harding and Mike Black

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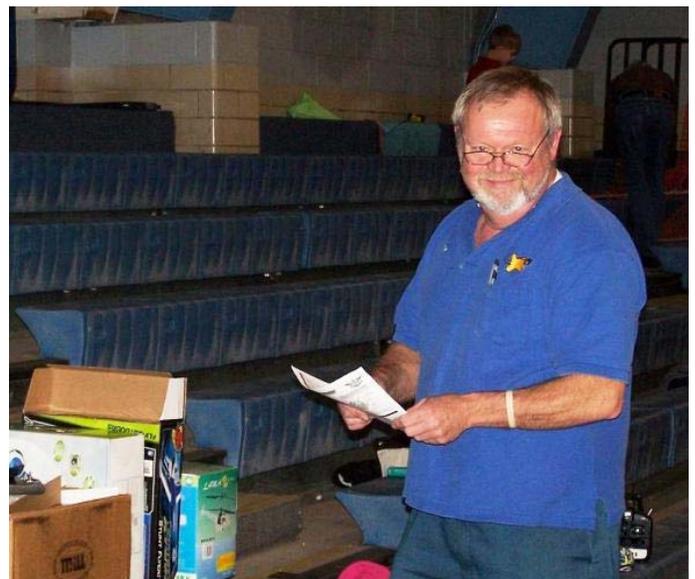
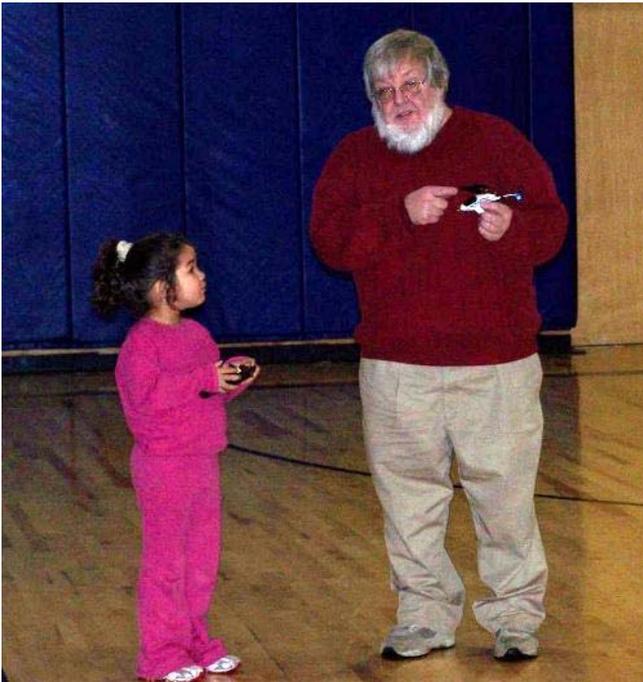
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Propstoppers Web Site; www.propstoppers.org
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More Indoor Mayhem





These are pictures taken from our last indoor meet in the Tinicum gym. Apparently it was a well attended event with some exciting incidence, all favorable in the end.

Why not come out to the last meet this year on Friday 9th March.

Dave Harding, reporting pictures provided by various Propstoppers.

A Club Airplane and Related Events for 2008?

Two years ago we bought 20 Cox Warbird kits as a club project and proceeded to enjoy these excellent, albeit rather fragile airplanes. And we enjoyed the Cox Warbird Day event.

Last year we supported the building of Trenton Terror Old-Timer with kits of parts provided by Mick Harris and a series of building sessions. Although most of these airplanes are still in work those that set out to do so have reported enjoying the experience.

I am wondering if we should hold such an event again this year, and if we do what should it be. At breakfast the other day we discussed several alternatives and perhaps we can continue the discussion at the next meeting.

The models on our list are;

More Warbirds of any size. There are all kinds of somewhat larger ARFs and even RTFs out there including the Parkzone Spitfire and the Hobby Lobby Alpha models.



Some kind of advanced trainer like the Mountain Models Magpie. We could buy the \$50 kits or build something like it ourselves.



How about a big easy to build foam delta?

How about a glider? Or a glow trainer ARF



Come out Tuesday and give us your views.

Dave



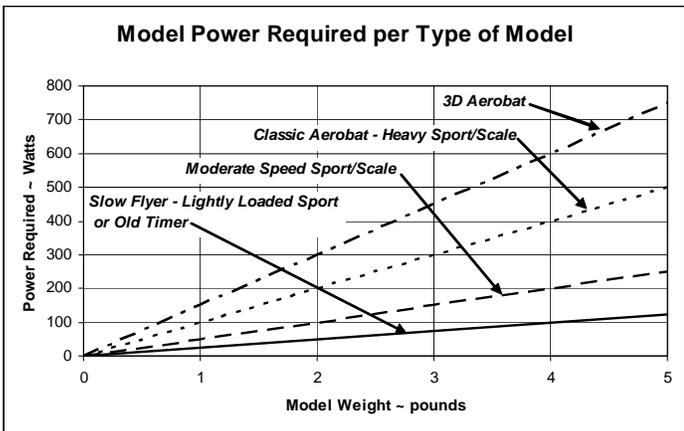
Picking Motors- A Black Art?

Well, I suppose it is a Black Art, particularly because there is no standard way of naming the various offerings from the huge array of manufacturers and dealers.

But there are a few things to get you started and the first is the performance expected for your new creation. The rules of thumb are in terms of Power Loading; watts per pound of all up model weight for each type of model and performance.

Model	Power Loading; watts / pound
Slow flying, lightly loaded sport and scale models	25
Moderate speed sport and scale models	50
Classic Aerobatic and heavy sport and scale models	100
3D Aerobats	150

Now as an example, just say you are planning to build a decent sized Spitfire and you want it to fly in a scale like manner. Further, let's say you think you can build it for an all up weight of four pounds. Go to the chart and read that you need about 200 watts of power.



Now power in watts is the motor current under load times the battery voltage;

$$\text{Power} = \text{amps} \times \text{volts}$$

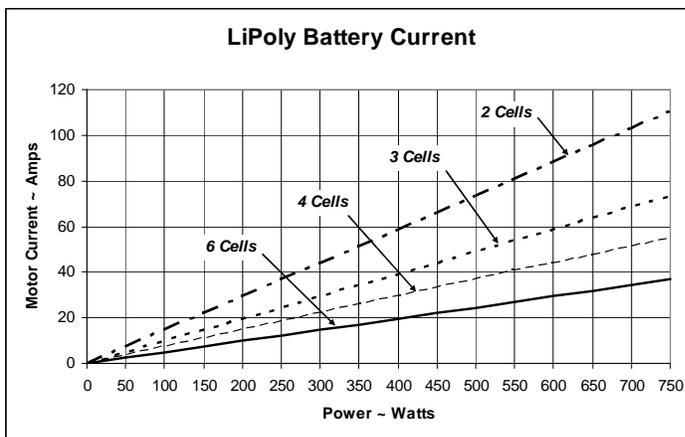
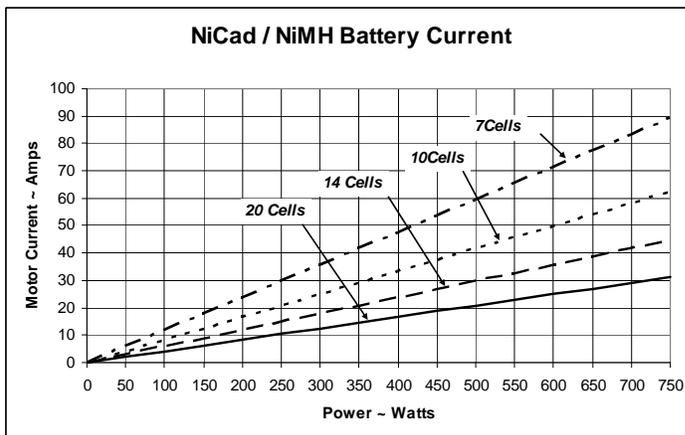
But you can choose the voltage by using a different number of cells. And, of course to achieve the same power there is a different motor current associated with each voltage level. You can either calculate this or read it off the next two charts. Here are the options for our 200 watt Spitfire;

NiCad / NiMH Battery and Motor Current Alternatives for 200 watts

Number of Cells	7	10	14	20
Unloaded Voltage	8.4	12	16.8	24
Current ~ Amps	24	17	12	8

LiPoly Battery and Motor Current Alternatives for 200 Watts

Number of Cells	2	3	4	6
Unloaded Voltage	7.4	11.1	14.8	22.2
Current ~ Amps	29	20	15	10



Let's just say for keeping it simple that you have already decided you will use a LiPo battery so the next step is to look at motor alternatives that fit these requirements. We will use the Hobby Lobby catalog for this and initially we will further restrict ourselves to AXI outrunner brushless motors, partly because that eliminates the step to select a gearbox and ratios. We can examine that alternative later.

Hobby Lobby lists their motors in order of the size and type of model they match. Here is the motor that fits our 64 ounce model;

AXI Gold 2814 Series Outrunner Brushless Motors

For airplanes 35 to 67 oz.

[AXI 2814 Outrunner Brushless](#) - These 4.6 ounce motors will fly 4+ pound model airplanes with authority! 4mm hardened steel shaft. Swing large props without a gearbox.



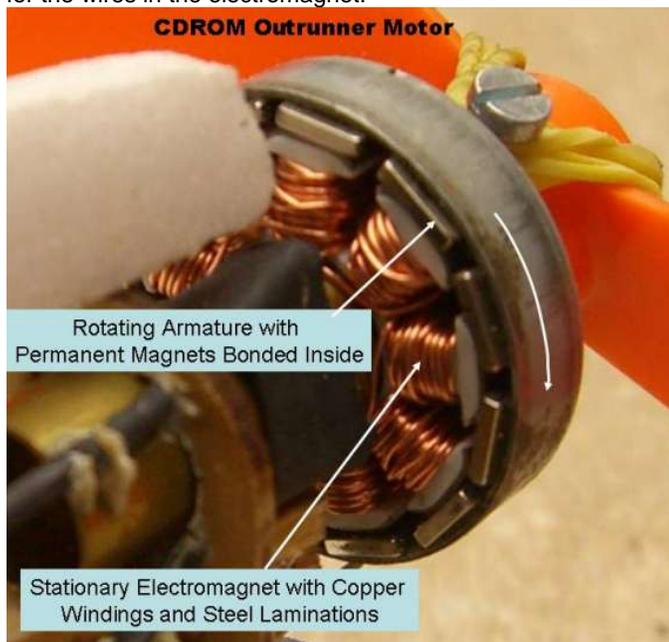
There are four different motors in this series, each with a different number of winds of copper wire in their electro magnets. Just look

at the data in this table and we will discuss the differences between motors.

Motor	Kv (RPM/V)	Battery/Prop	Controller	For Planes	Flying Type
2814/10	1640	2-3 LiPo, 6-8 Ni 2S Lipo - 10x6 3S Lipo - 9x5	70 Amp	35-67 oz.	Sport
2814/12	1390	2-3 LiPo, 7-10 Ni 2S Lipo - 11x7 3S Lipo - 9.5x5	40 Amp	35-70 oz.	Sport, Scale
2814/16	1035	3 LiPo 3S LiPo - 10x5 3S LiPo - 9x6	30 Amp	35-64 oz.	Sport, Scale, Sailplane, Aerobatic
2814/20	840	3-4 LiPo 3S Lipo - 10x5 3S Lipo - 11x5	30 Amp	35-67 oz.	Sport, Scale, Sailplane, Aerobatic

The AXI naming convention is actually used by a number of manufacturers. Each AXI motor has a 6 digit numbering system. For example: 2208/34. The first two numbers (22) represent the diameter of the stator (the fixed part in the middle of the motor) in millimeters. The second two numbers (08) represent the length of magnets (attached to the rotating case) in millimeters. The third set of two numbers (34) represents the number of wire winds, also called turns. Note that they don't explicitly define the maximum power allowed, although they seem to suggest is with the ESC rating.

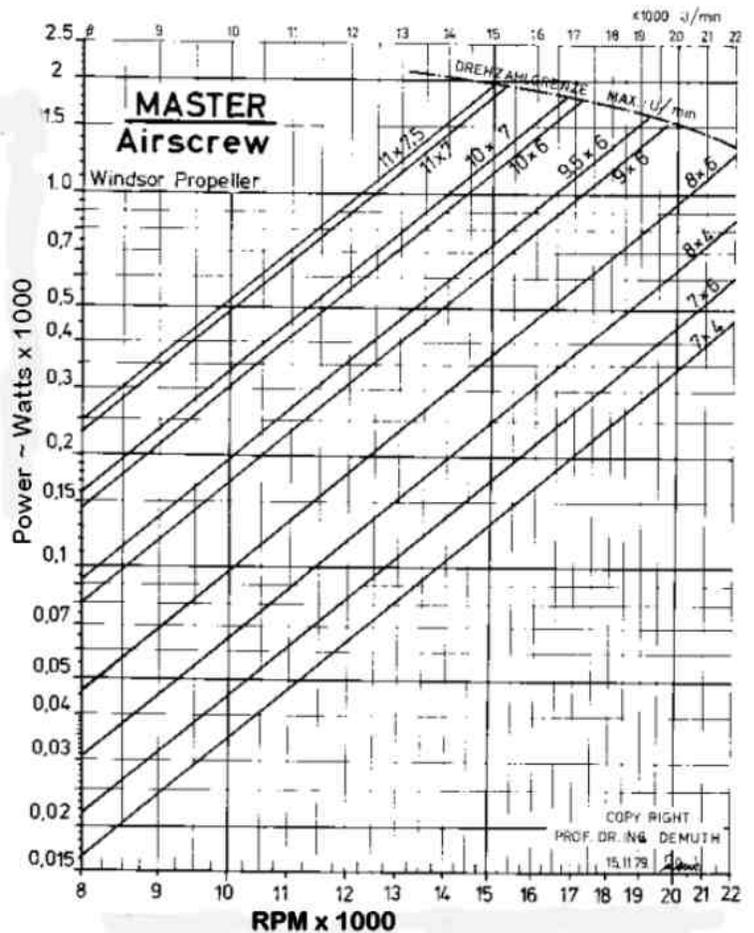
For a given motor design there is only so much space for the wires in the electromagnet.



You can either put in a few turns of thick wire or more turns of thin wire. Examining the table for the 2814 above there is one relationship that stands out and applies to all motors of the kinds we use. That is the fewer the winds, the higher the

current capability, and that stands to reason; fat wire can handle more current. The other factor that varies with number of turns is Kv. Kv is the expression of the rpm per volt; a characteristic fundamental to electric motors. It is the rpm per volt for an unloaded motor. As a load is applied the motor slows and the current increases, nevertheless, the Kv times the operating voltage is an indication of the operating rpm upper limit, and we can examine that vice the size prop that might match.

Look at the chart for the Master Airscrew props. It is a plot of power required to turn each prop at various rpms.



In Prof Demuth's chart the power is in Kilowatts so 200 watts is on the 0.2 horizontal line and the rpm is x 1000. So if we want to examine the AXI 2814/20 at 840 rpm per volt on three LiPo cells at 11.1 volts we might look at 9000 in round numbers as the unloaded speed. The loaded speed will be somewhat slower.

The chart suggest a prop of 10 x 6 or 11 x 7 might be in the right order and if we go back to the Hobby Lobby chart it suggests a 11 x 5 or 10 x 5 on three LiPo cells. Wow, I might even have this right!..... And if we then examine the LiPo Battery Current chart we will see that 200 watts requires 20 amps on three LiPo cells although with the inefficiencies in the electrical system the actual current would be more than that to account for losses so the conservative ESC rating of 30 amps seems appropriate.

But wait, there is a whole new issue here and that is the match of the propeller to the kind of flying we plan.

Let's look at the 2814/10 at 1640 rpm per volt on two LiPo cells. That would be 7.4 volts x 1640 = 12,136 rpm. From the chart

this would require a prop between 8 x 6 and 9 x 6 at something over 30 amps, maybe as much as 40 amps.

Both of these motors match the flight performance criteria but we have one with a small high rpm prop and the other with a slower larger prop. How do they compare in flight performance given that they have the same power?

Motor	Current	# LiPo Cells	rpm range	Prop	Static Thrust	Pitch Speed
2814/20	30	3	8/9,000	11 x 7	1.4	53
2814/10	40	2	11/12,000	8 x 6	1	63

It is the classic trade; big slow turner (relatively) produces higher static and low speed thrust but the smaller high rpm option produces thrust at higher speeds. So you "pays your money and takes your choice".

But wait, perhaps I cheated by using the Hobby Lobby data. Not all manufacturers provide it that way. Let's see if we can do an analysis with Steve Neu's line of motors; <http://www.neumotors.com/Old/neuproducts.html>

We will use the same 200 watt Spitfire. Neu motors are rated by their maximum power, so we find the 11xx series are good for 200 to 775 watts. We will pick the middle of the range 1110 size as probably being ok at the 200 watts continuously. Here they are;

Neu Motor 1110 Series Characteristics

Model	RPM/Volt	RPM/Volt with 4.4:1 Gearbox	No Load rpm with 2 LiPos	No Load rpm with 3 LiPos	No Load rpm with 4 LiPos
1110/1.5D	5600	1273	9418	14127	18836
1110/1Y	4700	1068	7905	11857	15809
1110/2.5D	3500	795	5886	8830	11773
1110/1.5Y	3400	773	5718	8577	11436
1110/2Y	2500	568	4205	6307	8409
1110/2.5Y	1900	432	3195	4793	6391

We can see from this that with the available gearbox there are several winds and number of LiPo cells that will do the job and indeed span further at both ends of the match; it can turn both smaller and larger props depending if you want low speed or high speed performance.



Ok, now what about Himax motors? <http://www.maxxprod.com/mpii/mpi-262.html>

Here are their 250 watt outrunner. Both of them seem to fit the application.

Himax 250 watt Outrunners

Motor Part Number	Prop Size*	ESC Rating	Kv	No Load rpm with 2 LiPos	No Load rpm with 3 LiPos
HC3510-1100	10x5-12x6	25	1100	8140	(12,210)
HC3510-1540	8x4-10x5	35	1540	11396	NA

So this is one way to pick a motor for your new model. It relies on the propeller power data and a statement of the motor power capability. But there are other ways to do it. My favorite is to use Motocalc, a \$40 computer program that does all these calculations for you and also computes the resulting aircraft performance.

I ran some Motocalc analysis on our notional Spitfire using some of these same motors;

Motor	Battery	Prop	Motor current ~ Amps	Motor input power ~ watts	Rate of Climb ft/min	Level Speed mph
AXI 2814/10	2S TP2100	10 x 6	30	200	563	40
AXI 2814/20	3S TP2100	12 x 8	20	217	650	43
Neu 1110/1.5Y	3S TP2100	11 x 8	20	220	875	43
Himax 3510-1540	2S TP2100	9 x 8	31	210	581	45

See, it validates the performance achieved with 50 watts per pound with rates of climb in the 500 – 600 ft/min range and level flight speed of 40 – 45 mph.

But note the prop selection is somewhat different, mostly a little bigger but probably the manufacturers have included some conservatism.

If there is some interest I will continue this series and further explore motor sizing and the use of Motocalc and some of the free on-line motor analysis programs like the one on Diversity's website;

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

Go try it with some of your planned models. Let me know if it is useful to you.

Dave Harding

The screenshot shows the 'In-flight Analysis - Spitfire 40' window. It displays motor specifications: HIMAX HC3510-1540, 1540rpm/V, 1.8A no-load, 0.029 Ohms. Battery: Polyquest PQ-2500xP (20C), 2 cells; 2500mAh @ 3.7V; 0.0067 Ohms/cell. Speed Control: Castle Creations Phoenix 35; 0.0045 Ohms; High rate. Drive System: 9x8 (Pconst=1.31; Tconst=0.995) direct drive. Airframe: Spitfire 40; 600sq.in; 64oz RTF; 15.4oz/sq.ft; Cd=0.056; Cl=0.53; Clopt=0.56; Cmax=1.2. Stats: 51 W/lb in; 39 W/lb out; 19mph stall; 28mph opt @ 57% (20:15, 135°F); 29mph level @ 57% (20:26, 135°F); 559ft/min @ 13.2%; -258ft/min @ -6%.

Rise Spd (mph)	Drag (oz)	Lift (oz)	Batt Amps	Motor Amps	Motor Volts	Input (W)	Loss (W)	MCbOut (W)	MotCb Ef (%)	Shaft Ef (%)	Prop RPM	Thrust (oz)	PSpd (mph)	Prop Ef (%)	Total Ef (%)	Time (m:s)
27.0	6.0	56.8	30.6	30.6	6.9	209.7	52.0	157.7	75.2	69.6	8431	21.4	36.9	45.3	31.6	4:54
28.0	6.5	61.1	30.6	30.6	6.9	209.7	52.0	157.7	75.2	69.6	8430	21.1	35.9	46.6	32.4	4:54
29.0	6.9	65.6	30.6	30.6	6.9	209.7	52.0	157.7	75.2	69.6	8430	20.9	34.9	47.7	33.2	4:54
30.0	7.4	70.2	30.6	30.6	6.9	209.6	52.0	157.6	75.2	69.6	8432	20.7	33.9	48.9	34.0	4:54
31.0	7.9	74.9	30.6	30.6	6.9	209.5	51.9	157.6	75.2	69.7	8435	20.5	32.9	50.0	34.8	4:54
32.0	8.4	79.8	30.5	30.5	6.9	209.3	51.8	157.5	75.2	69.7	8439	20.3	31.9	51.0	35.6	4:55
33.0	9.0	84.9	30.5	30.5	6.9	209.0	51.7	157.4	75.3	69.7	8445	20.0	31.0	52.1	36.3	4:55
34.0	9.5	90.1	30.4	30.4	6.9	208.7	51.5	157.2	75.3	69.8	8453	19.8	30.0	53.0	37.0	4:56
35.0	10.1	95.5	30.4	30.4	6.9	208.3	51.3	157.1	75.4	69.9	8462	19.5	29.1	54.0	37.7	4:56
36.0	10.7	101.1	30.3	30.3	6.9	207.9	51.0	156.9	75.5	69.9	8472	19.3	28.2	54.9	38.4	4:57
37.0	11.3	106.8	30.2	30.2	6.9	207.4	50.7	156.6	75.5	70.0	8484	19.0	27.3	55.8	39.0	4:58
38.0	11.9	112.6	30.1	30.1	6.9	206.8	50.4	156.4	75.6	70.1	8497	18.8	26.4	56.6	39.7	4:59
39.0	12.5	118.6	30.0	30.0	6.9	206.2	50.1	156.1	75.7	70.2	8511	18.5	25.5	57.4	40.3	5:00
40.0	13.2	124.8	29.9	29.9	6.9	205.5	49.7	155.8	75.8	70.3	8527	18.3	24.6	58.1	40.9	5:01
41.0	13.9	131.1	29.8	29.8	6.9	204.8	49.3	155.5	75.9	70.4	8544	18.0	23.7	58.9	41.5	5:02
42.0	14.5	137.6	29.7	29.7	6.9	204.1	49.0	155.2	76.0	70.6	8558	17.8	22.8	59.6	42.0	5:03
43.0	15.2	144.2	29.6	29.6	6.9	203.3	48.5	154.8	76.1	70.7	8578	17.5	22.0	60.2	42.6	5:04
44.0	16.0	151.0	29.4	29.4	6.9	202.4	48.0	154.3	76.3	70.8	8598	17.2	21.1	60.8	43.1	5:06
45.0	16.7	157.9	29.3	29.3	6.9	201.4	47.5	153.9	76.4	71.0	8619	16.9	20.3	61.4	43.6	5:07

Motor performance calculations take ambient temperature and heating effects into account.
Color Key: Propeller Stalled | Stall Speed @ Cmax=1.2 | Level Flight @ Clopt=0.56 | Level Flight @ Cl=0.53

Dave Harding – Editor
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Propstoppers R.C. M.A.C



Will we have a Propstopper plane project for 2008?

Going to the Lebanon Flea Market?

Saturday 8th March

Want to coordinate a car pool like we did in the old days?

Send a message to the Yahoo Propstoppers Group stating time and place and if you want a ride or passengers.

propstoppers@yahoo.com

Used to be Granite Run Mall lot by McDonalds at 7:30am

Event Calendar

Last Indoor Flying Meet

Friday March 7, 2008

Tinicum School Gymnasium

6:30 till 9 pm

AMA membership required to fly.

Guest flyers and spectators welcome.

Non Flying

Central Penn Flea Market 8th March

Membership Renewal For 2008

Membership renewal for 2008 is now available. You can renew by mail or at the club meeting in March

**Bring cash or check and your AMA card.
Dues are \$60.**

Ray Wopatek
1004 Green Lane
Secane, PA. 9018

Please enclose a **copy** of your current

A. M. A. Membership card,

And Please, Please enclose a

Stamped self-addressed envelope.

Ray Wopatek Membership Chairman