Bigger is Better, Isn't It?

Of course you have noticed that things are getting bigger. The Big Mac is passé, now it is Quad, 64 ounce sodas are the norm, and people are getting bigger, much bigger. Have you noticed the double wide seats in the doctor's office and double wide wheelchairs?

Well it is happening in SAM electric powered competitions too. So let me describe the history, at least for the time when I became involved with them.

Fixed Battery Size Rules

My first "serious" SAM electric competition model was a 350 sq inch Stardust Special in 2003.

I powered it with two different motors, one for LMR and the other for Texaco, both using the previous rule's 7 x Sanyo 800 mah NiCads. Because those cells were no longer made the rule was then changed. To include any NiCad pack that weighed 8 ounces or less. Trouble was, there were high capacity cells that allowed almost twice the energy as the old pack and although they would not handle the current required for LMR the were ideal for Texaco where you cruise climb at low throttle settings. I won Electric Texaco at the 2003 Champs with a flight of over an hour. While in the middle of the flight Jim Hainen asked when I would be finished with the channel 42 and I said about 45 minutes he had a fit! But there you are, I didn't make the rules.

But with a fixed battery size rule you can calculate the optimum model size. It turns out the model with the best performance weighs 1/2 half the battery weight; 8 ounce battery with a 4 ounce model; 12 ounces all up weight. I won again in 2004 with such a model, this one was a 170 sq inch Stardust Special. Some remember this flight, of over an hour, as it started in clear weather and proceeded through a rain storm only to land on the flooded field after the storm had passed.

Something had to be done to curtail these long Texaco flights so the new rules addressed this issue.

Energy per Pound Rules

The new rules allowed a battery capacity to vary with the model weight, just like the 4 cc of fuel per pound in Ignition and Glow Texaco. The idea was to allow models of different size to compete on an even basis, or at least that was our intent.

But in the Limited Motor Run event a really well engineered model could climb to about 2000 feet or more, and a small model was hard or impossible to see at the top of the climb. My 350 sq inch Stardust Special would go out of sight at about 70 seconds into the 90 second climb. (Al Tafts, a top competitor at the time, told me all his models go out of sight in the climb, but he could see them after the transition to glide!). So a bigger model might solve this problem. It also made sense for following thermals as you can see the model at higher altitude and maybe follow the thermal longer. So people began to make bigger models, and it didn't hurt that bigger models of identical design have better aerodynamics due to the Reynolds Number effects.

So for 2006 I built a 1050 sq inch Stardust Special which I flew at the Champs in both events.

And other competitors were building bigger models. Jack Hiner won Texaco with an 800 sq inch Playboy.

John LeTrent also flew an 800 sq inch Playboy to second place in LMR.

But the game changer was Glenn Poole's 75 % Boehle Giant at 1626 sq inches.

Jack Hiner said this was the best flying SAM airplane he had ever flown. Now let me tell you why this is significant. Jack is a former World Glider Distance Record holder; he is several times League of Silent Flight Level V flyer and among the very best flyers in SAM. I heard him clearly and decided to build one, but not a scale one, I would build a full sized one at 2880 sq inches; 20 sq feet.

It took a while, but for a model that size I couldn't see spending a lot of money buying a very large and powerful motor for LMR so I concentrated on the Texaco event. (Classic Texaco too with a Forster 99)

I flew it at the 2008 Champs but the model was not sorted yet so Jack won the Texaco event with the same 800 sq inch Playboy and I won the LMR event with the 1050 sq inch Stardust Special.

By the 2010 Champs I had sorted out an adequate motor setup for LMR using the same Neu motor I had in the Stardust Special but with an additional gearbox in front of the existing planetary so I could turn a really big prop. It still did not have the maximum performance allowed by the rules but it was adequate, and indeed, just as Vernon Boehle wanted in 1936, I could see it at great altitude.

Meanwhile the BIG movement was picked up by others. Jay Burkart and his Kentucky Posse flew a fleet of 1326 sq inch Airbornes.

Jack Hiner was now flying a 1000 sq inch Airborne and won the Texaco event, I placed second with the Giant. Jay Burkart was third with an 810 sq inch Airborne and Hank Gullett was fourth with a 1326 sq inch Airborne.

I won LMR with the Giant in a 55 minute fly-off late in the afternoon with Jay second with an 810 sq inch Airborne and Hank third with a 1000 sq inch one. Dale Tower joined the very large airplane crew with a huge Stardust Special. He place fourth. During the flyoff I followed the Kentucky Posse fliers, all three of them in a huge thermal with me underneath. They could not see their models all the time; they were at 3300 feet recorded on Jay's altimeter. I could clearly see the Giant.

But it is like the old Racer's Credo; "If a little is good, more is better" so the Kentucky Posse, well, Jay, built a new fleet of even bigger Airbornes and I built a 1400 sq inch Stardust Special. This picture is from Eloy in 2013.

In 2012 the Kentucky posse built 1600 sq inch 1600 sq inch Airbornes for Jay Kent and Hank in LMR and Texaco. Of course just because you have a big model doesn't mean you will always win and Dick Bartkowski proved the rule by winning the 2012 Champs LMR event with his 665 sq inch Record Hound. But Jay and Hank were second and third with the big Airbornes and Glen Poole fourth with an 1100 sq

inch Playboy Sr. Leon Kinkaid was fifth, one second behind with another "small" model, a 512 sq inch Playboy Cabin.

Jay won Texaco with the big Airborne only using a 3 minute motor run but the rest of the results were all over the map so although I don't really remember it the weather must have been a bigger factor than the models that day. Jay tells me there was an inversion layer and you had to punch out high to get up to it.

So the race continues.

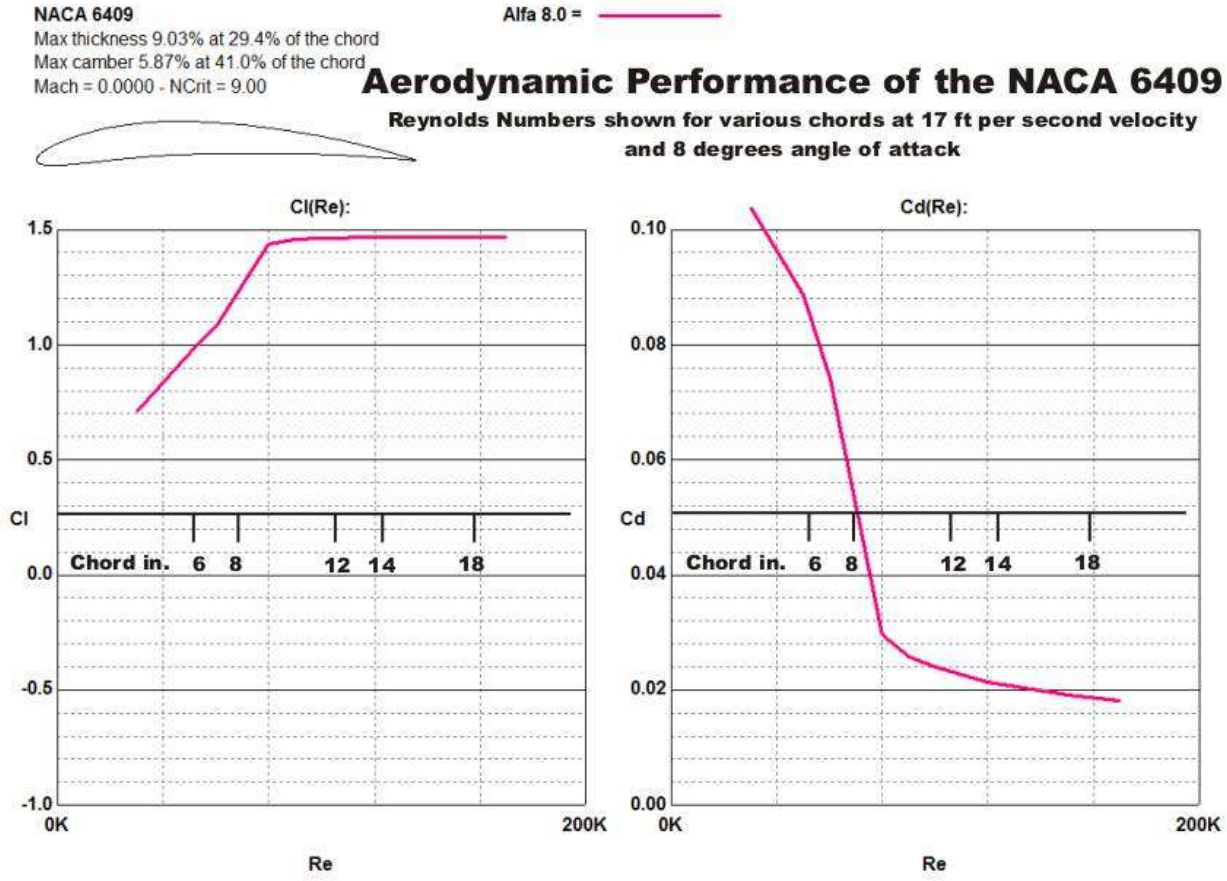
Did I say bigger is better, and never leave well enough alone? So, Jay Burkart; master builder, the Willow Run Plant of Kentucky (Jay's Aircraft Factory) with the support of Jim O'Reilly's CAD skills and Bob Holman's ever loving laser a Squadron (6) of 2300 sq inch Airbornes were built. Here are Jay, Hank and Kent at the Ft.Wayne meet.

By the way, you think Ed Hamler is the King of Airbornes? Well Jay probably deserves that mantle. He built them is sizes; 280, 340, 490,600,810,1000, 1326,1600, 2316……. starting with a SOY kit in 340 size that he built with Kent Meglemry about 9 years ago and liked it so much he built 2 490's and 2 600's right off the bat.

He is now building the #56 and #57, yes that is one hell of a lot of them but he really got them down and like the way they fly. Of course he built a number of them for other guys and sold some of his old ones too.

Tech Talk

Oh, remember the Reynolds Number factor I highlighted above. Well here is a sneak peek at the data;



Here is the aerodynamic performance of the once popular NACA 6409 at various Reynolds numbers. Like most airfoils you see as the Re goes above about 40,000 the lift increases and the drag reduces. Plotted on the chart are the approximate wing chords (for airplanes flying at 17 ft/second; about what we glide at with the 8 ounce wing loading) related to their Reynolds numbers. Read off the CL and CD for each chord and compare the change in lift and drag. Both the Giant at 2880 sq inches and the 2600 sq inch Airborne have 18 inch root chords! But notice that things don't get all that much better for this airfoil beyond about 10 inch chord. This is probably why my 1050 sq inch Stardust Special with 10.5 inch chord flies so well. But of course you can see the bigger airplanes higher!

Enough tech.

Here is Phil Semmers with his big Airborne set up for Texaco, and the story of the first test flying done by Jack Hiner.

Phil flew his Airborne 2300 this morning just after sun up at the sod farm. Actually I flew the model. I checked the model a couple days back at Phil's house. Weight is close to 198 ounces. Cool and overcast this morning with 40% chance of rain with a light SSW wind. Off the ground after maybe a 50 foot roll but I had to hold in some down elevator as the climb was more than I wanted. After gaining some altitude I throttled back to about 50% and still a good climb. So reduced the throttle some more and the model held the altitude or climbed a bit. Motor/prop appears to be an excellent choice for the big bird set up for Texaco. Thunder was heard so we cut the flight short and made a good landing. Rain started before we got to the van to take the model apart. We got soaked but I am sure Phil was happy with the flight and next time out he will be at the controls. Phil made a wedge for the trailing edge of the wing to reduce wing incidence. I would have liked a bit more height to the wedge so a bit less wing incidence. Phil may be happy with the wedge and we will see once he flies the model. Phil, measure the wedge and let me know how high it is at the trailing edge so I can add the wedge to mine. With the 18 1/4 inch root wing chord the Reynolds Numbers are high enough you need less wing incidence than required by smaller Airbornes. What a glide when I cut the throttle. No brake so the prop was spinning when the motor was shut down. Now 4 of these 2300 Airborns are flying that I know of. Thanks to Jim O'Reilly and Bob Holman for plans and laser cut ribs.

Jack

Dave Harding's response;

Darn, you guys keep raising the bar!

I had retired the Giant, but just for grins and the only SAM meets within hundreds of miles I threw something together to fly it in May. I used a very old Aveox 1415/3Y that I had been flying in my Hanger 9 Cub. But being a so-so pilot I bent it and the shaft of the Robbe planetary one (well lots) too many times. Initially I could buy the new $35 shafts from Aveox but they quit supporting them, then I found a guy in California who did boats and he could order them from Germany, so I bought some more. Now they are no longer available and I asked myself why I was flying this beast with a $400 motor; Answer, fly it with a $70 outrunner and put the Aveox back on the shelf; where it was available for the Giant.

It flew pretty well with the old Aveox H160 ESC that cost me an arm and a leg way back. Anyway, on the second flight it cut in the climb and when I got it back I found the fried ESC; into the bin with that.

But it got me thinking and running Motocalc to see what could be done.

I have not seriously considered a full-on LMR power system for the Giant; too darn expensive for a handful of flights. I did fly it with the Neu 1506/1Y and compounded the 6.7:1 gearbox with a 2:1 spur front end and with two LiPo cells and a huge prop, pulling maybe 120 amps it was decent at the 2010 Champs, but not really up to full potential allowed by the rules.

Subsequent discussions with Steve Neu led me to understand the motor could take 200 amps, and the Castle 125 amp ESC could do so too, so I thought about that but it was still less than competitive, so I retired the Giant to sport flying at club picnics.

But the Aveox motor got me thinking again and I found the Motocalc predictions were on 8S LiPos at 50 amps I could be approaching a decent performance. The system has efficiency in the mid 80% range. Now with a 6.7:1 gearbox it would be fully competitive, but with the Robbe 3.7:1 it may be good enough.

Then I remembered that in the last rebuild I did not include the forward fuselage transport joint necessary to put it in my airline box, and although it is a straightforward modification I didn't want to take the time to do it. So LV Champs are out for the Giant.

BUT WAIT, I transported the Giant to LV in our community Greyhound shipping box twice, so no sweat, I can do it. What else can stand in my way? Well, the ESC for one thing and I realized that although I have some heavy metal in that department they are all low cell counts. What to do? Well, as it happens Hobby King sent me one of those annoying emails but I pushed the button and hey presto, a 70 amp ESC for a gazillion cells for $70. I wonder if I could get it for the next SAM 12 meet on Sunday! Yep, got it in three days, so now we shall see.

Watch out guys…..

Oh, just remembered, you guys are flying the HUGE Airbornes in Texaco. Got you covered with the 1400 sq inch Stardust Special there. A much better airplane than the Airborne. Of course, I could go back and sort out the Giant ETex propulsion systems…….

Let the games begin…… or continue…

Dave