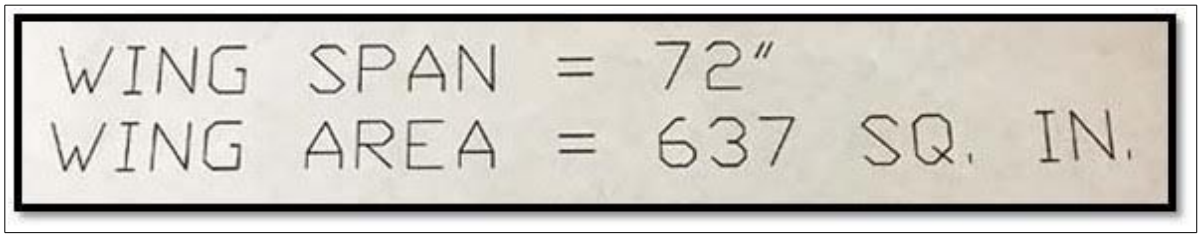
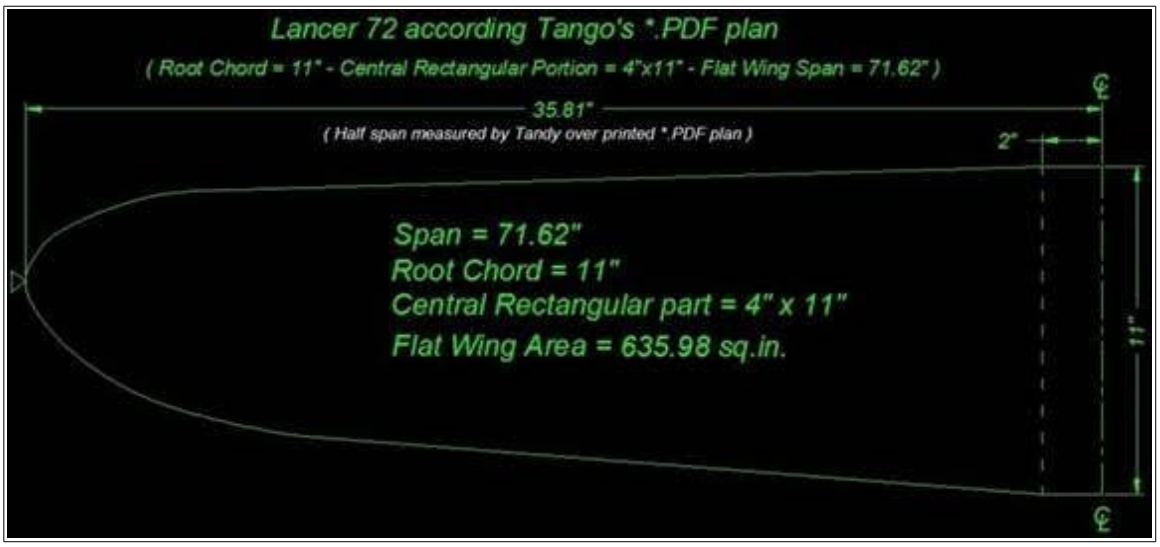
New Cyclone Lancer 72

November 14, 2017 part 2

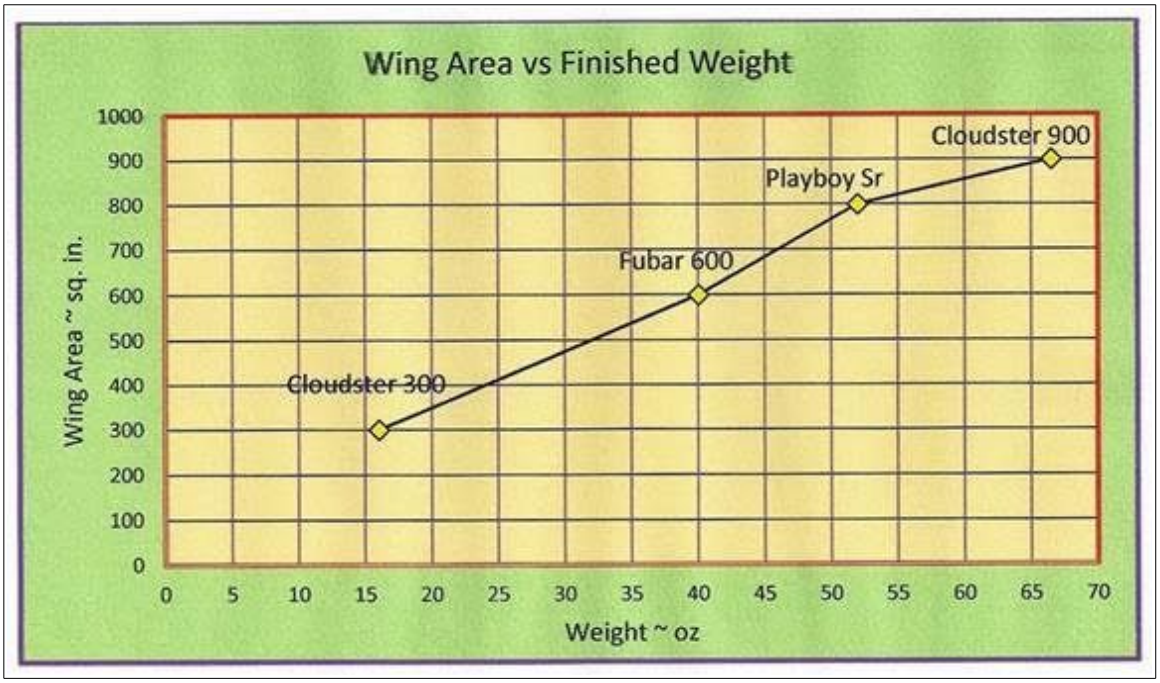
The Holman Lancer 72 plan drawn by George Tango that I am using shows the model has a 72" wing span and a 637 sq. in. wing area as you can see below.



The wing's half-span of the printed plan was carefully measured to be 35.81" (71.62" full span). I sent this measurement and the wing plan PDF file to my friend Alfredo Herbon in Argentina to calculate the wing area using his ACAD program. Alfredo's results shown below calculated the area to be 635.98 sq. in. The model's Aspect Ratio = (Span X Span)/Area = (71.62 X 71.62)/635.98 = 8.065.

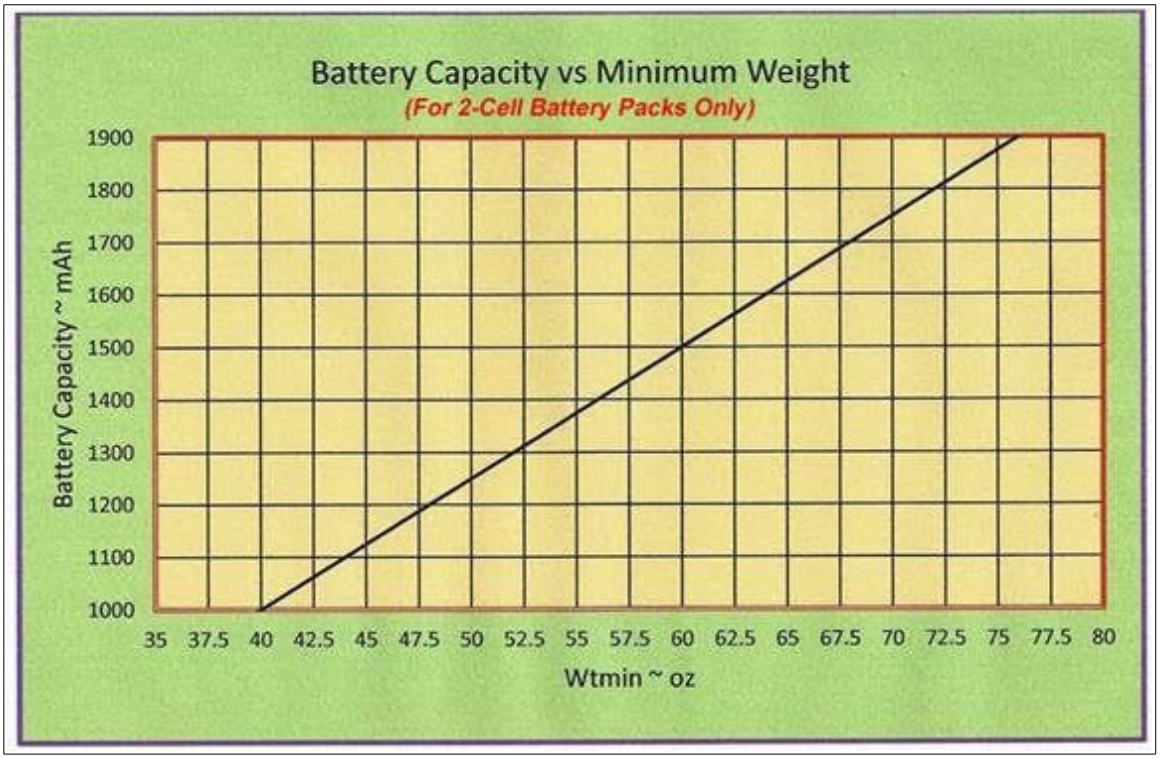


To determine an estimate for model weight, four previous electric model projects shown below were selected which are different in size and power trains, but used the same construction techniques. The chart below provides a cursory weight variation with wing area for these four models. This chart shows that an 636 sq. in. electric Lancer 72 will weigh in the neighborhood of ~ 42 oz. Also while the variation in the chart is only approximate at best, it does provide an idea of what the scaled Lancer 72's weight might be for a given wing area.

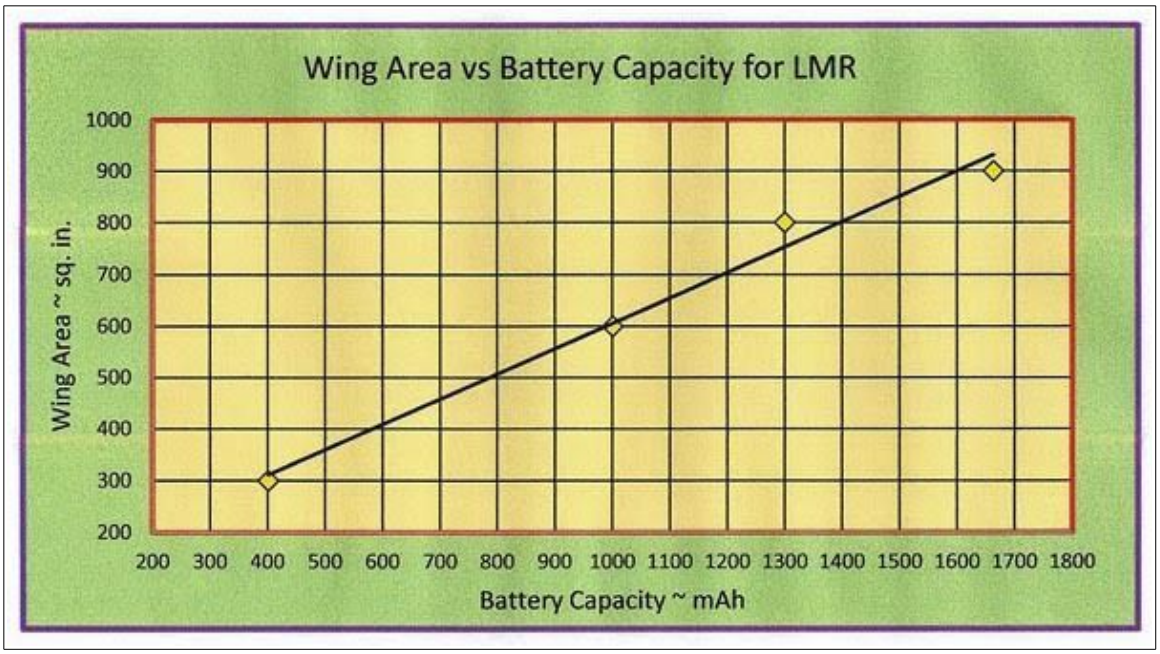


The SAM rules for electric Texaco and Limited Motor Run (LMR) state that model's wing loading must be 8 oz/sq. ft. or greater and that the minimum weight is defined as a function of LiPo battery capacity in the following way: WTmin = (No. Cells X Capacity)/50

This variation is shown in the chart below for 2-cell batteries with capacities between 1000 mAh and 1900 mAh.



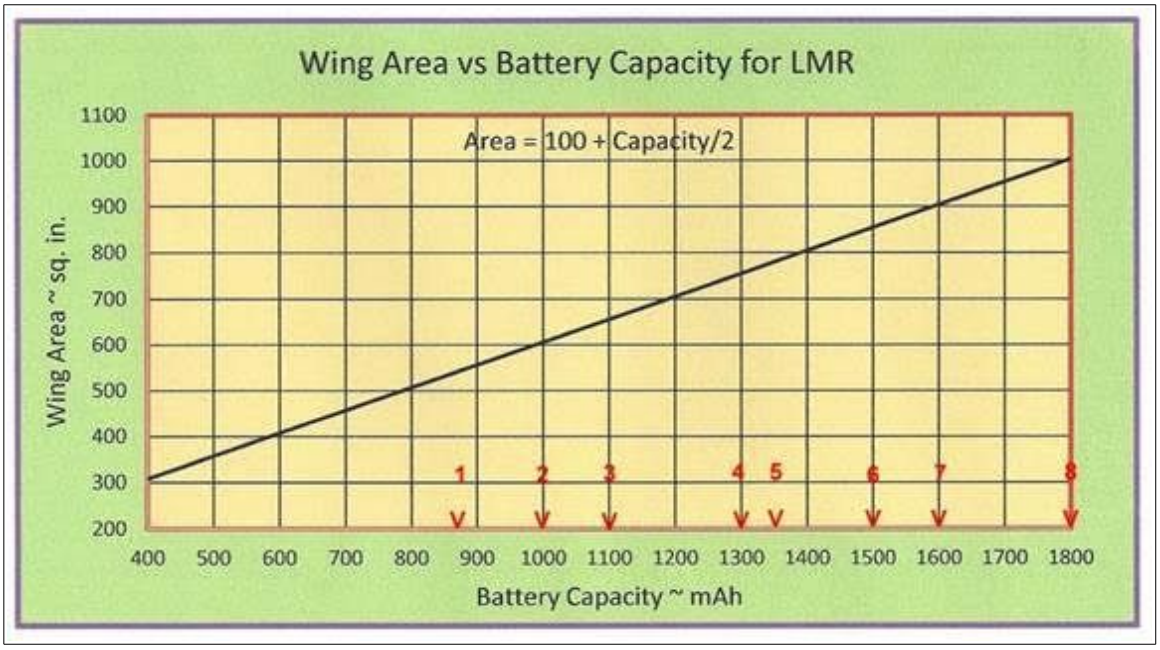
It is my opinion that scaling should be done based on wing area. To develop the parametric sizing chart shown below, battery capacity was cross plotted against wing area from the two previous charts. The four data points were then used to establish the approximate linear variation defined by the black line in the sizing chart below.



In sizing a model for SAM electric LMR competition, one must be aware that LiPo battery packs are only available in certain discrete capacities and "C" ratings. Further, for LMR competition, it is desirable to get a high C rating of 50 or above if possible. An online search for 2-cell LiPo battery packs had to be made before scaling a model to a specific size to avoid being overweight or having to add ballast weightto the model to meet the rules. This search identified eight packs in the range of interest, which are shown below.

- Thunder Power 870 2S 55C
- Turnigy Graphene 1000 2S 65C
- Hyperion 1100 2S 70C
- Thunder Power 1300 2S 55C
- Thunder Power 1350 2S 25C
- Zippy Compact 1500 2S 40C
- Hyperion 1600 2S 45C
- Thunder Power 1800 2S 65C

These eight (8) battery capacities were plotted on the sizing chart as shown below.



This sizing chart was used to determine wing area estimates for each of the 8 battery packs, which are presented follows:

1. 550 sq. in. for the 870 2S 55C
2. 600 sq. in. for the 1000 2S 65C
3. 660 sq. in. for the 1100 2S 70C
4. 750 sq. in. for the 1300 2S 55C
5. 775 sq. in. for the 1350 2S 55C
6. 850 sq. in. for the 1500 2S 40C
7. 900 sq. in. for the 1600 2S 45C
8. 1000 sq. in. for the 1800 2S 65C

In Dave Harding's post I received today, one of the key points he made was:

"Above a certain wing chord, bigger models *(have higher Reynolds Number and therefore)* have somewhat better aerodynamics and ..... you can see them higher!"

Considering Dave's point about bigger models and looking at the parametric data developed above, Candidate No. 6 was selected as an upper limit for a one-piece 82.8" wing. This selection has the following characteristics:

Candidate No. 6

- Wing area will be 850 sq. in.
- Scale factor will be √(850/635.98) = 1.126
- Wing span will be 1.254 X 71.62 = 82.80 inches

- AR = (82.80 X 82.80)/850 = 8.065
- Minimum weight is (2 X 1500)/50 = 60.0 oz
- Wing Loading = 60/(850/144) = 10.16 oz/sq. ft.
- LiPo will be the Zippy Compact 1500 2S 40C

Once built, if Candidate No. 6 is ends up as much as 4 oz overweight, the Hyperion 1600 2S 45C LiPo battery pack can be substituted to achieve the minimum weight of (2 X 1600)/50 = 64.0 oz, which is wing loading of 10.84 oz/sq. ft.