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FW: 1 Scaled Up 1/2A Fubar 600 - Tandy's Next R/C Electric Project

1 message

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To: Trevor Boundy <trevor@boundy39.com>

Fri, Apr 19, 2019 at 2:24

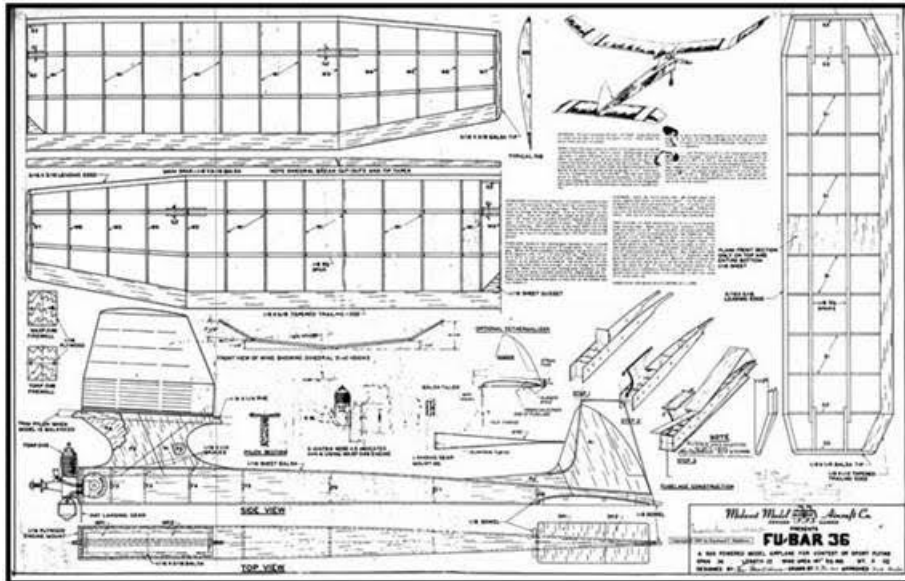
From: Tandy Walker [mailto:aerotan1503@outlook.com]
Sent: Wednesday, March 16, 2016 2:12 PM
Subject: 1 Scaled Up 1/2A Fubar 600 - Tandy's Next R/C Electric Project

*Scaled Up 1/2A Fubar 600**March 16, 2016*

Ray Matthews designed his 1/2A Fubar in 1950 and it was a great performer right from the very start. The true competitive spirit of Ray's Fubar designs was demonstrated when Ray's protégé Gene Jackman from Oklahoma City won the 1951 National Junior Championship with Fubar designs. The picture below is an action shot of Gene launching his Half-A Fubar in competition at the 1951 Nationals.



Shortly thereafter, the Midwest Model Aircraft Company produced the **Fu-Bar 36** kit shown below of Ray's 1/2A Fubar design.



Back Ground on Why the 1/2A Fubar was Selected for Scaling

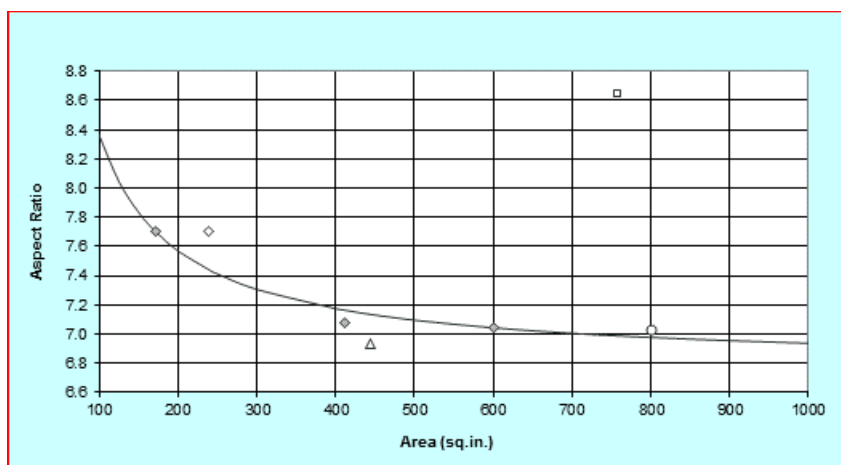
In 2003 I took a look at scaling up Ray Matthews 36" 1/2A Fubar to 600 sq. in. for Class B/C Nostalgia free flight competition, but then stopped the project for some reason that escapes me now. However, in February of 2007 I revisited the work and wrote Ray a letter sharing my rationale for this project and pointing out some of the NFFS Nostalgia approval challenges I had to overcome.

In the letter, I pointed out that during the 18 months I spent writing the book about Ray and documenting his many free flight designs, I became very familiar with the details of all of his free flight designs. After I finished the book, I begin to get letters from all over for book orders. Typically, the book orders came from modelers of the 1950's era. In almost every letter, the older modeler would tell me that as a young man he had built the Midwest kit of 1/2A Fubar and it turned out to be an outstanding performing free flight. However in almost every case, their 36" Fubar flew away in a thermal because they had not equipped it with a dethermalizer. These letters got me to thinking about what was it that made the 1/2A Fubar design such a great performer.

Ray had drawn up the little 1/2A Fubar design in 1950, two years after he had designed the 65" prototype Fubar and it had been a great performer right from the very start. This prompted me to do a design comparison to see if I could determine configurational features that would account for such good flying qualities.

Aspect Ratio

To begin with, I looked at wing efficiency. A good indication of wing efficiency is a high aspect ratio, which is defined as $(Wing\ Span\ Squared / Wing\ Area)$. The aspect ratios for all of Ray's Fubar designs were plotted against wing area in the chart below. You can clearly see that the smaller the model, the



larger the aspect ratio is for Ray's designs. The 171 sq. in. 1/2A Fubar has the highest aspect ratio at 7.7 and therefore should have the most efficient wing planform of any of the Fubar designs.

Stab-to-Wing Area Ratio

Another thing I observed was that while the larger Fubar designs have stab-to-wing area ratios in excess of 42%, the 1/2A Fubar had only 39%. This shows that the 1/2A Fubar has a smaller horizontal stabilizer in relationship to its wing area than the larger designs. It is unclear how this relates to better performance, but perhaps it is a result of both drag and weight reductions.

Lighter Construction

In my opinion, I think the scaled up 1/2A 36" Fubar can be built lighter than the larger Fubar designs using a new lighter and stronger spar design. In summary, I found the desirable features of the 1/2A Fubar design to be:

1. *Experience has shown the 1/2A Fubar to be an outstanding performer.*
2. *Its wing has the highest aspect ratio.*
3. *It has a smaller stab.*
4. *It can be built to a lighter weight.*

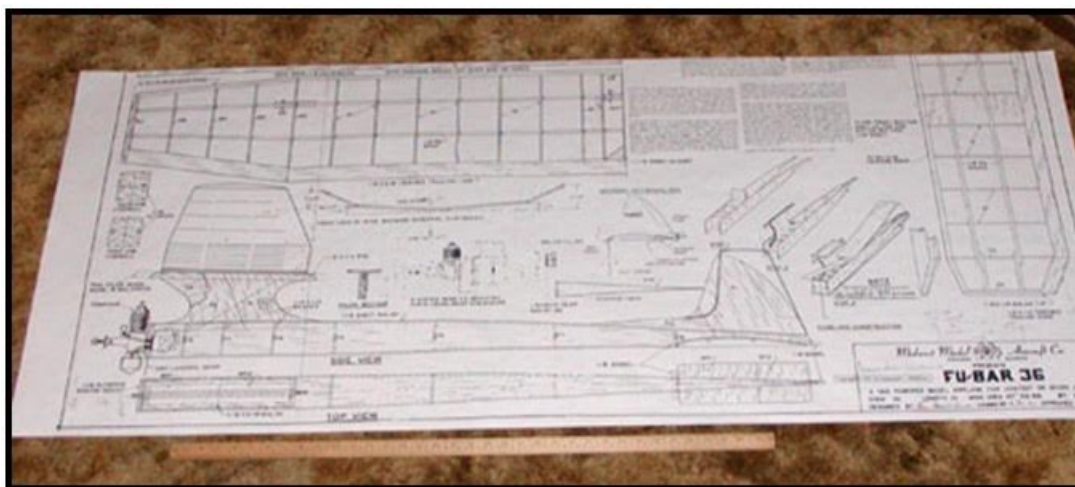
Scaled Up 1/2A Fubar Design

Scaling

So the next step was to scale the standard 1/2A Fubar plan with a wing area of 171.34 sq. in. up to a plan with a wing area of 600 sq. in., which is shown below. The scale factor was calculated as follows:

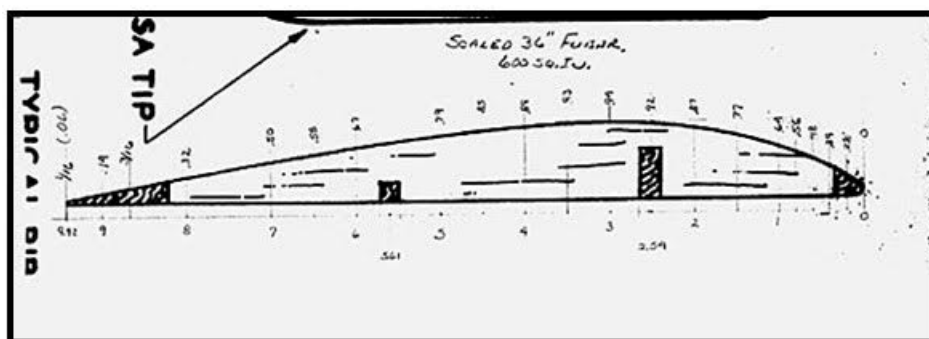
$$\text{Scale Factor} = \sqrt{600/171.34} = 1.8713$$

Notice the yardstick at the bottom of the scaled up plans below. This size should be ideal for a .29 engine for Class B and still accommodate the increased power of a larger .35 engine for Class C.

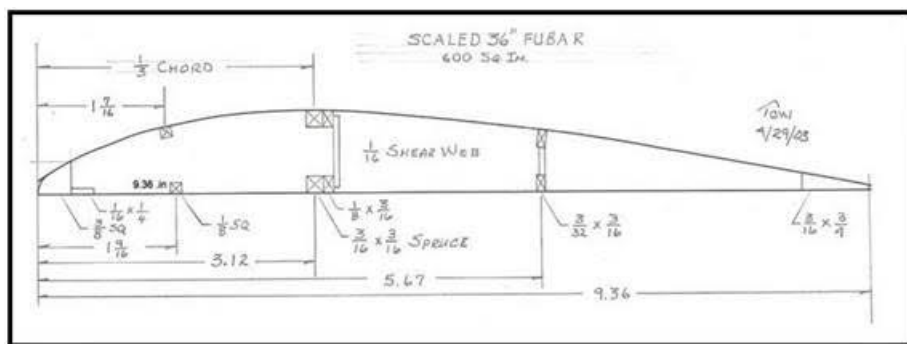


New Spar Design

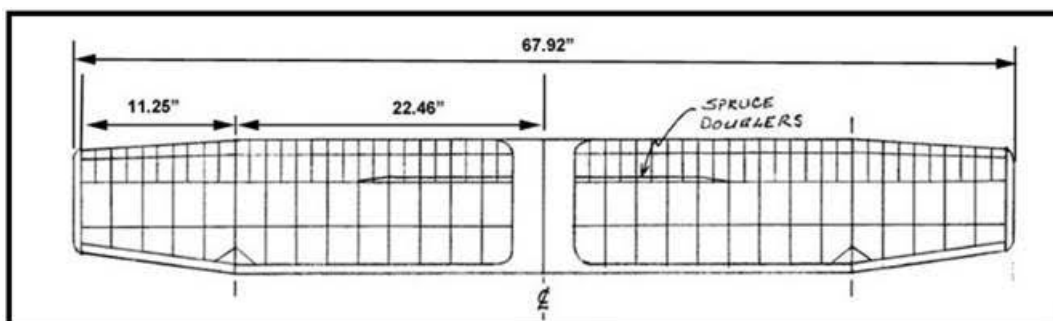
The 1/2A Fubar spar arrangement is shown on the rib drawing below. One of the first considerations was to develop a lighter and stronger wing spar configuration for the 600 sq. in. scaled up wing using the "spar-over spar" design connected with shear webs.



The NFFS Nostalgia Committee had already approved the standard 1/2A Fubar for competition at this time and therefore a scaled up version of the 1/2A Fubar would be Nostalgia legal also. However, I knew that the NFFS Nostalgia chairman, Keith Fulmer, would be very critical of any spar changes that I might make, so I addressed this problem up front and early on. Appendix B in my book contains the documentation of the necessary correspondence via e-mail with the NFFS Nostalgia Committee to get the new spar design approved for competition. There were thirteen separate e-mails starting on April 16, 2003 and approval finally coming on April 29, 2003. The final spar design that was approved for NFFS Nostalgia competition is shown below. (If you have a copy of my book, I encourage you to read Appendix B through in order to understand the number of iterations and amount of effort it took to obtain the Nostalgia Committee's approval.)



The general layout of the wing is shown below with the new spruce spar doublers, sub ribs, and shear webs. Since the scaled up wing span came out at 67.92", the rib distribution was modified by adding more full ribs and half ribs as shown below. There are 10 full rib bays between the wings centerline and polyhedral joint for the wing's inner panel. Notice that the spruce spar doublers terminate 4 rib bays inside the polyhedral joint.



Tandy's Next Project

A few months back I sent my friend Glen Poole in Yorkville, Illinois a copy of the 36" 1/2A Fubar plans. Glen built it as an R/C electric model and won first place with it in one of the SAM electric events. Subsequently Glen and Jay Burkart have requested that Jim O'Reilly scale the 1/2A Fubar up to several different sizes including a large 1600 sq. in. size and requested that Bob Holman cut laser parts for the various sizes.

All this activity has rekindled my interest in the previous work I have done on the 600 sq. in. scaled up 1/2A Fubar, except my new project will be directed toward electric R/C instead of gas powered free flight.....Tandy