

TWO MINUTE TWINS – A REALITY

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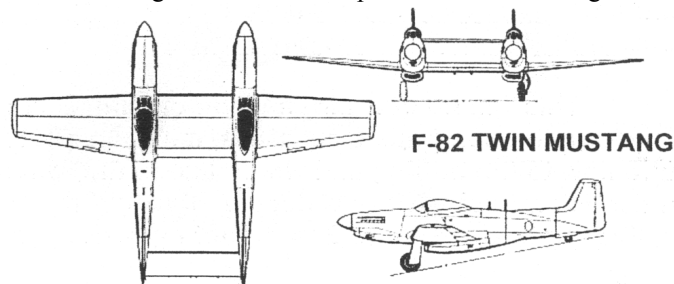
Over the last three decades, the popularity of scale models with two or more motors has been increasing along with their performance. According to the results of the first FAC Nats, published in the Aug/Sep 1978 issue of MaxFax, there were only two twins entered in FAC Scale. Dennis Norman's Tigercat

which flew for 30 seconds and placed 14th, and Ralph Kuenz's A-26 which flew for 32 seconds and placed 44th. A perusal of the Geneseo judged scale events over the last five years will indicate that many multi-engine models were entered with winning times often as high as 90 seconds or more. However, these times can be deceiving because they often represent the longest of three official flights. With three attempts, the chance of getting good air on at least one flight is quite high.

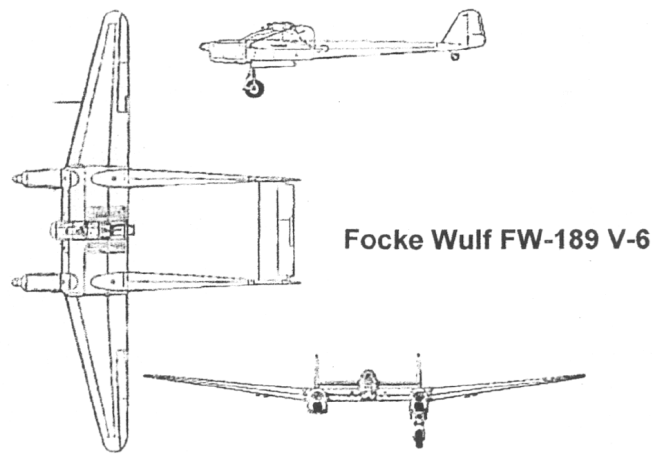
This is not to say that multi-engine models cannot be made to fly over 90 seconds or even more than two minutes without the aid of thermals. To perform this well, a multi-engine model would have to have a relatively small frontal area, and a configuration that would allow a *very* long propeller to rear peg distance (long fuselage and nose moment) and not restrict propeller size. In addition, it would have to be built to an extremely low wing loading. This is very important with multi-engine models since they have so much drag due to the additional freewheeling propellers and increased area. Heavy models must fly faster to stay in the air, and drag increases exponentially as speed becomes greater. When calculating wing loading on multiengine scale models for the purpose of estimating endurance, the area wiped out by the extra fuselage or nacelles should be subtracted from total area entered into the equation to obtain a true picture.

Very few subjects that have ever been flown on the contest circuit comply with all of the foregoing requirements. Some of those that come closest include the F-82 Twin Mustang, Focke Wulf FW-189 V6, Bestetti-Nardi BN-1 and a few project aircraft that never made it into the air, but qualify for competition according to FAC rules. They all have one thing in common, twin booms.

The F-82 has rather bulky fuselages but a small frontal area as compared to most twins with engines in wing nacelles. It also has a long nose moment which enables a rearward peg location and the use of long motors. In recent years many have been built and flown in FAC competition. Apparently, they fly quite well, have won contests but, according to published results, have not dominated the competition. This may be because they were too heavy, or that the propeller/motor combinations used limited duration. However, the F-82 appears to have considerable potential providing it were built to a light wing loading, and equipped with optimum propellers and motors. Such a model, built to minimum Jumbo Scale or maximum FAC Scale size, and weighing less than 100 grams should be capable of 90 second flights.

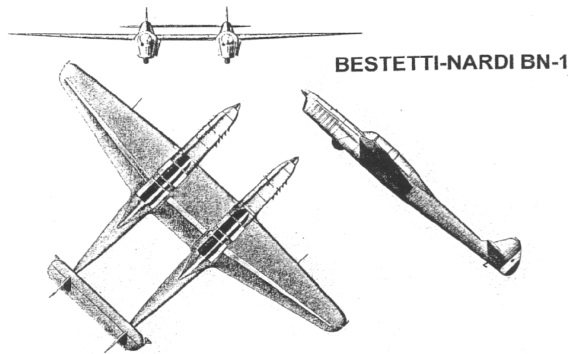


For some reason, scale modelers on both sides of the Atlantic have overlooked the very interesting ground attack variant of the FW-189. This airplane, the FW-189 V6, has an extremely small fuselage pod but is otherwise identical to the better known observation version. The drag and extra weight of the glassed-in, bulbous fuselage of the latter aircraft severely limits endurance. The tiny fuselage and slender booms of the V6 create a very small frontal area. In addition, because of the swept back leading edges of the wing, it has a long nose moment. I built one from an enlarged and much revised Koutny plan of the observation variant. The large greenhouse like fuselage was eliminated and replaced by the tiny armored cupola of the V6. The resulting model flew very well, easily winning Jumbo Scale at Geneseo in 2007 with a flight of 1:55. It may have had assistance from a mild thermal on that flight, but the ship flies consistently over 90 seconds in still air. The only significant problem with the subject is that the booms are so slim that the amount of rubber that can be installed is limited. Even though the booms on my model were built with wrapped formers, there was still insufficient room for the large motors that would be necessary for flights of two minutes or more. My favorite 6 strand x 1/8" x 20 gram motor would not fit so 4 strands of 0.155 rubber weighing only about 13 grams was used instead.



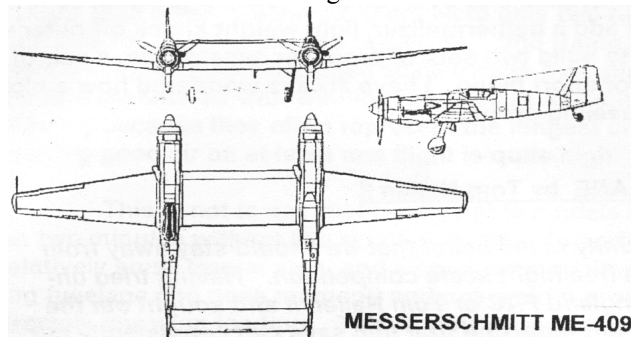
Focke Wulf FW-189 V-6

The Bestetti-Nardi BN-1 is an obscure WW II Italian twin boom fighter. Veteran FAC'er Mark Fineman flew his 36" wingspan version of this airplane to 2nd place in Jumbo Scale at Geneseo last year with a flight of 1 :27. This was only the third flight of the model which was still under development. Mark told me that his BN-1, built from his own plan, had flown 1 :20 on an earlier flight and had to be fished out of a tree on the other. What is really remarkable is that the model weighed only 74 grams and was grossly underpowered. The two loops of 1/8" rubber used in each boom only amounted to about 18% of the model weight. These motors were coupled to 8" diameter propellers with the blades cut from yogurt containers. Imagine what his ship could do with larger motors or if it were built to Giant Scale size where it would have an aerodynamic advantage over the smaller version.



BESTETTI-NARDI BN-1

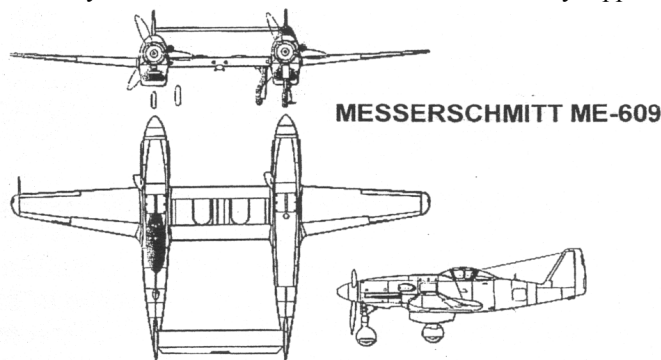
Certain project aircraft also have the potential for achieving long flights. My twin boom Arado E-530 caught a thermal at Geneseo in 2005 and won Jumbo Scale with a flight of 3:15. It won again in 2006 without the aid of a thermal with a 90 second flight. The model has a 37" wingspan and weighs about 100 grams. The E-530 has a very long nose moment and a long propeller hook to rear peg distance, but a rather skimpy wing and bulky twin booms. Two 15 gram motors using 6 strands of 1/8" rubber were used out at Geneseo, but longer motors should improve duration to over 90 seconds despite the model's relatively small wing area and the bulk of its radial-engined booms.



MESSERSCHMITT ME-409

There are a number of other project aircraft that appear to have even more potential including the ME-409, Horkey Twin Reno racer, Reggiane RE-2005 Bifusoliero and ME-609. I built a model of the RE-2005 which won Giant Scale at Geneseo

in 2006 and 2007 by comfortable margins with 93 and 109 second flights. The RE-2005 Bifusoliero is a twin fuselage version of the elegant WW II single engine fighter. It has a long slim booms, a long nose moment and generous wing area. My model has a wingspan of 43" and a weight of 108 grams. Using two 15 gram motors (6 strands x 1/8") and propellers with a diameter of 10" and a pitch of 11", it is capable of consistent flights of more than 90 seconds without the aid of thermals. Months after the 2007 Nats, while testing it in early morning air using 20 gram motors, the model put in three flights of about 1 :50. What was impressive was that the motors were only wound to 2000 turns. The 20 gram 6 strand motors are similar to those used in some P-30's but twice as long. P-30 flyers commonly wind 10 gram motors to 1100 or more turns so it is obvious that the motors in my RE-2005 could have taken a few hundred more turns. I have been using the same motors in several other competition models for years. I wind them to 2100 turns and have never broken one, another indication that the motors were not fully wound and that the model could have easily topped two minutes.



The twin fuselage ME-609 has proportions similar to the RE-2005 but a narrower wing. Nevertheless, It should be a great flyer. The ME-409 has an extremely high aspect ratio wing and may also be worth consideration if built to about a 50" wingspan. The futuristic but little known Horkey is a different matter altogether. The fuselages are very long but the subject has a rather small swept back wing which results in a nose moment that is actually so large that rear ballast would be necessary. Accepting that, it could probably take very long motors running all the way back to the tail. With optimum propeller/rubber combinations, motor runs over 90 seconds could be possible with two minute flights within easy reach. Czech scale champ Lubimor Koutny has created 1/20th scale plans for the Horkey, ME-609 and BN-1 which could be enlarged to comply with the dimensions of the various FAC scale categories. Koutny also has plans for the single engine ME-209 which could be used as a basis for drawing plans for the ME-409, the twin fuselage version.

Of all the aforementioned subjects the Bestetti-Nardi BN-1 appears to have the most endurance potential primarily because it could be built to a very light wing loading. A check of the 3-view and photos from the internet of the actual airplane indicate that it has very slim booms with flat sides, easily replicated without the need for a multitude of stringers. The long nose moment will allow a rearward placement of the motor peg. Even the blue color of the prototype could be reproduced using only blue tissue without the added weight of colored dope or paint. If Mark Fineman could build a 36" wingspan Jumbo Scale to only 74 grams, it should be possible to construct a sufficiently robust 43" wingspan Giant Scale model to considerably less than 100 grams. Such a model would be a real floater and, using the same 20 gram motors and propellers as on my RE-2005, should be capable of longer flights, likely over two minutes.

Despite this impressive endurance potential, the BN-1 might have a difficult time competing against some of the other models mentioned above because of the FAC method of scoring flight times. Times that are between 90 and 120 seconds only receive 1/4 point/second and anything over two minutes doesn't count at all. Also, since the BN-1 has a shoulder wing configuration, it only garners 30 bonus points while the others are all low wingers which are awarded 35 points. This extra 5 points could make a big difference in final scores.

A Giant scale BN-1 is very high on my building list. Mark Fineman was very gracious in sending me a copy of his plan already enlarged to 43" wingspan. Measurements indicated that it had the same nose moment and propeller hook to rear peg distance as compared to my Reggiane Bifusoliero. This would allow me to use the same motors and propellers on the BN-1 that I employed with success on the RE-200S. Since the BN-1 should be capable of being built lighter than my RE-200S, performance should be greater. A comparison of the Fineman plan with Koutny's BN-1 plan indicated that Mark's drawing is much more true to scale. It will soon be published in a commercial magazine and be available to everyone. The enlarged plan sent to me needs few revisions over the smaller one. I will probably add a dethermalizer, light weight knock off outer wing panels and a different stabilizer section. It would be fun to build two sets of propeller assemblies, a pair of freewheelers for scale competition, and a pair of folders for sport flying. I have always wondered how a high performance twin could fly without the drag of two freewheeling props.