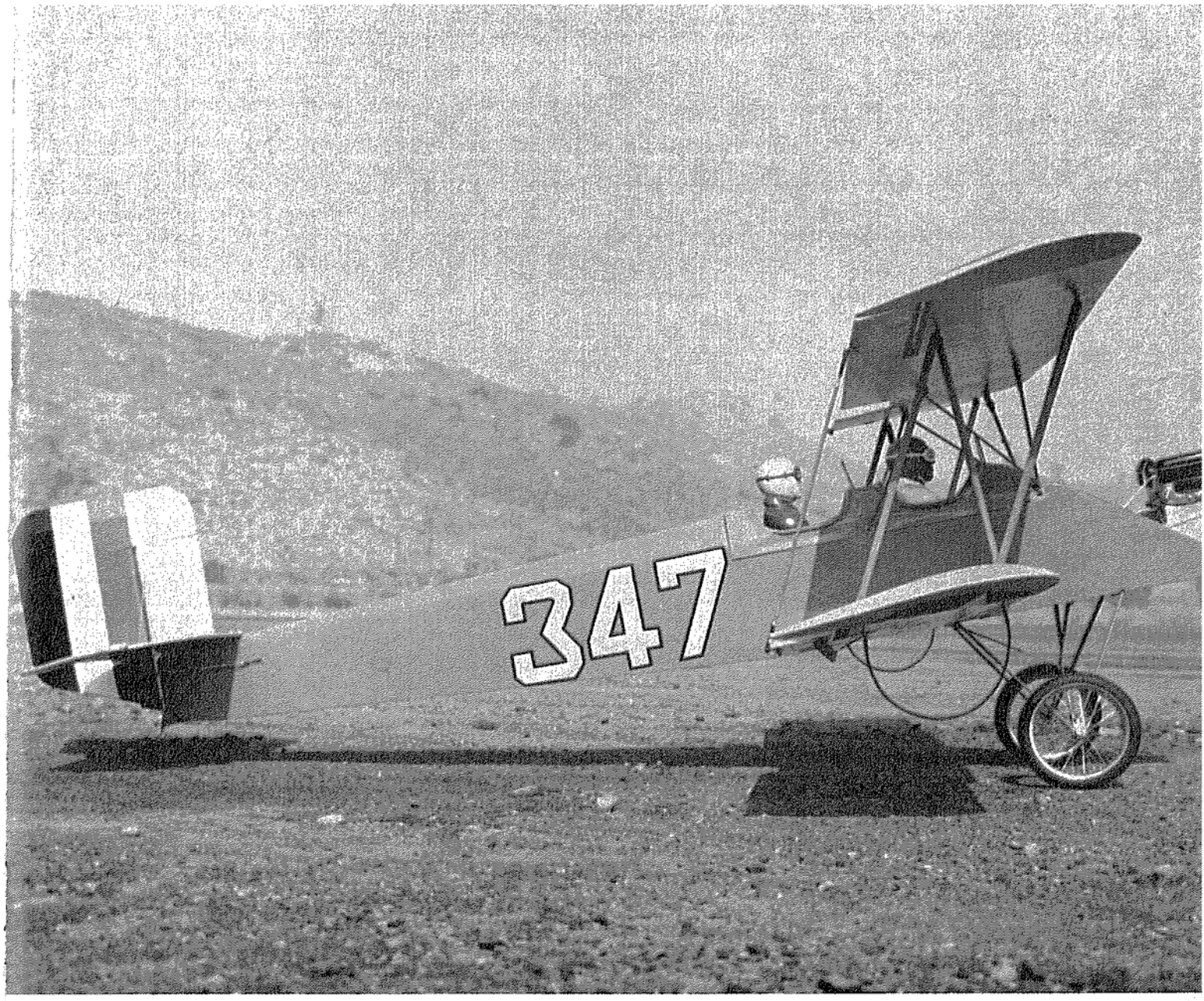
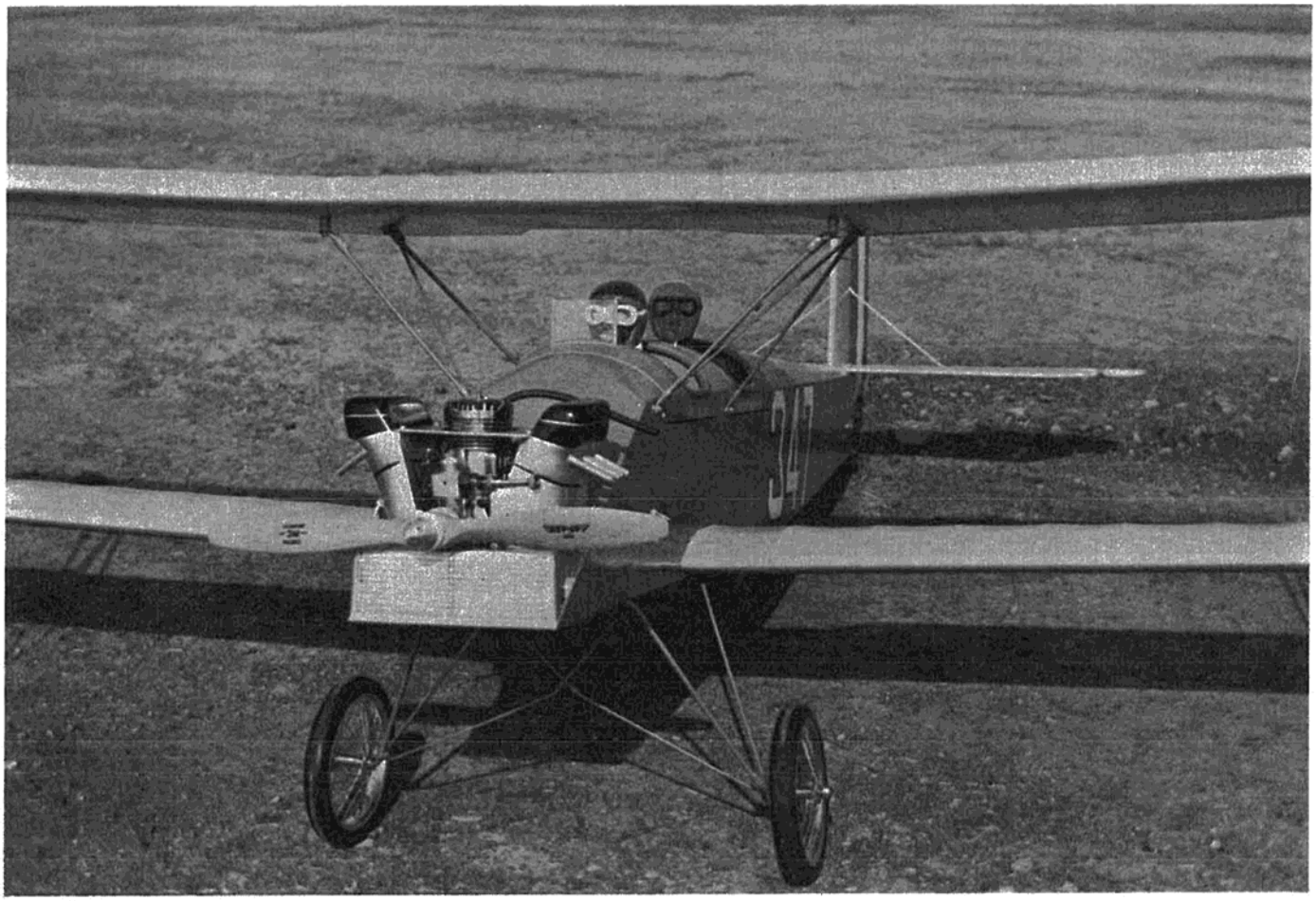


D. F. ETCHINGS'

CONSOLIDATED PT-1

Photos and Text By

GEORGE HARRIS



Engine details of Witty Etchings RC version of the first Air Corps standard primary trainer. Note excellent detail.

IN the San Diego phone book is a listing for D. F. Etchings, better known as Witty to fellow members of the San Diego Drones. When he has nothing else to do he likes to build beautiful R/C scale models — mostly old biplanes — that really fly. I mean they are flown every week like most people fly sport models! They have all kinds of detail such as instruments, pilots, deadly looking machine guns on some, and a host of other goodies. His latest is the Consolidated PT-1, first of the trainers for the Army Air Corps to have the PT trainer designation. The model is one-sixth full size, but it loops, rolls, snap rolls and does all kinds of weird things in addition to flying very well. However, Witty would rather build and fly than draw and write, so I was enlisted to brag about his new toy.

First a little history of the full size bird. When Consolidated Aircraft Co. was founded in 1923, the company owned the design rights to the Dayton Wright TW-3, which was a primary trainer with side by side seating. Consolidated built approximately 20 of these for the Army Air Corps but the visibility for the pilot and instructor was poor. Modifications were made to improve the plane, including tandem seating, which allowed both occupants to see from both sides of the cockpit. The first 50 had water cooled Wright built engines, while subsequent aircraft (about 220) were fitted with Wright radial engines. This aircraft was designated the PT-1 and, in 1927, was the standard primary trainer for the Air Corps. Wing span was 34 ft. 7½ ins., length 27 ft. 8½ ins., with a top speed of 100 mph and a cruising speed of 85 mph.

The markings shown on the drawings are of the first numbered primary trainer, a photograph of which can be found in the Air Museum Historical Aircraft Series titled "Training Aircraft of the U. S. Air Force 1925-1965." Good drawings of the PT-1 seem to be as scarce as knee socks for a rattlesnake, so details were obtained from Nieto drawings of the PT-3 which was developed directly from The PT-1. The main differences are in the vertical tail surfaces, elevators, nose and engine.

All surfaces in the model are scale except the ailerons, which have been enlarged because the model is just too sluggish with the very small scale-size ailerons. The model is detailed enough to collect good scale points, but has been compromised a little in the hair splitting features to make it more attractive to a larger number of builders. No photo could be found of the actual PT-1 instrument panel, but a PT-3 panel and details of the rigging wires can be found in drawings of the PT-3 in Air Progress for October/November 1963, for those who want to go all out. The fuselage is big enough to hold any gear and most of the big engines will fly the bird. All of the pieces are held together by screws, but if you don't care what it looks like, the attachments can easily be modified to use rubber bands. At the time of writing the model had completed more than 75 flights in a variety of wind conditions without anything coming adrift. Anyhow, if you dork a big biplane like this, rubber bands aren't going to help very much!

Now to the building. If you don't like wings go ahead and build the fuselage first. If you really don't like wings, turn the page, this machine has lots of them! The full length plywood sides of the fuselage make a very rugged structure and are quite light. Glue all the longerons, braces and doublers to the sides first, then insert the formers and join the sides. A couple of the bottom fill pieces of sheet installed at this time will hold the thing square. The tail end is then pulled together and the top decking installed. It is advisable to get the engine mounting and all control layouts setttled before buttoning up the struc-

ture. Wherever parts are secured to hardwood pieces you can use wood-screws if the stresses are low, or sheet metal screws, or machine screws and blind nuts. Sheet metal screws hold very firmly in maple and can be used for the parts which will not be dismantled very often.

The landing gear and cabane struts are just a matter of careful bending and assembly. Accurate sizing of the struts will simplify rigging later. Wire wheels by Boling add a nice touch. Actually the tires are thinner than scale, but how fussy do you want to be? For best handling a tailwheel coupled to the rudder is advisable, although the near scale skid shown is O.K. on a hard surface.

The removable top hatch can be assembled on the flat floor or built up in place on the fuselage, small key blocks keeping it lined up. The hatch can be held by screws as shown, or by your favorite hatch latch. Windshields are simply flat plastic held between side posts.

A very realistic engine can be built up from blocks without going into vast detail. Exact shaping and clearances will depend on the noise box concealed in the middle. The tie plate between the two sides stabilizes the blocks against vibration. Leave good clearance for cooling around the engine.

The tail surfaces are very simple and rugged and can be built up on one side on a flat board, then turned over and repeated. Small ply scabs may be glued over the screw holes in the tailplane center section to prevent the heads from pulling through. Details like this and such things as gussets at various places have not been shown on the drawings, since this kind of thing is instinctive to the more experienced builders, who will be tackling this project. It becomes a case of pointing up the background so much that the foreground goes underground. Most elaborate scale jobs are largely a matter of cut, fit and improvise, anyway. The struts, from the fin to the tailplane, carry the loads of that big barndoor rudder flapping around, which would soon break off an unsupported fin.

The good old flat bottomed airfoil makes the wings easy to build and the hardwood spars provide all the necessary strength. Note that the leading edges are bigger than the notches in the ribs and the cap strips butt up against them. Use good hard sheet for the trailing edges. All of the basic wing structure is very conventional. The pre-drilled maple blocks are epoxied to the ribs and spars at the proper locations and can be reinforced by gussets if you want to play safe. Small sheet corner pieces over the lug positions will hold the covering around the holes.

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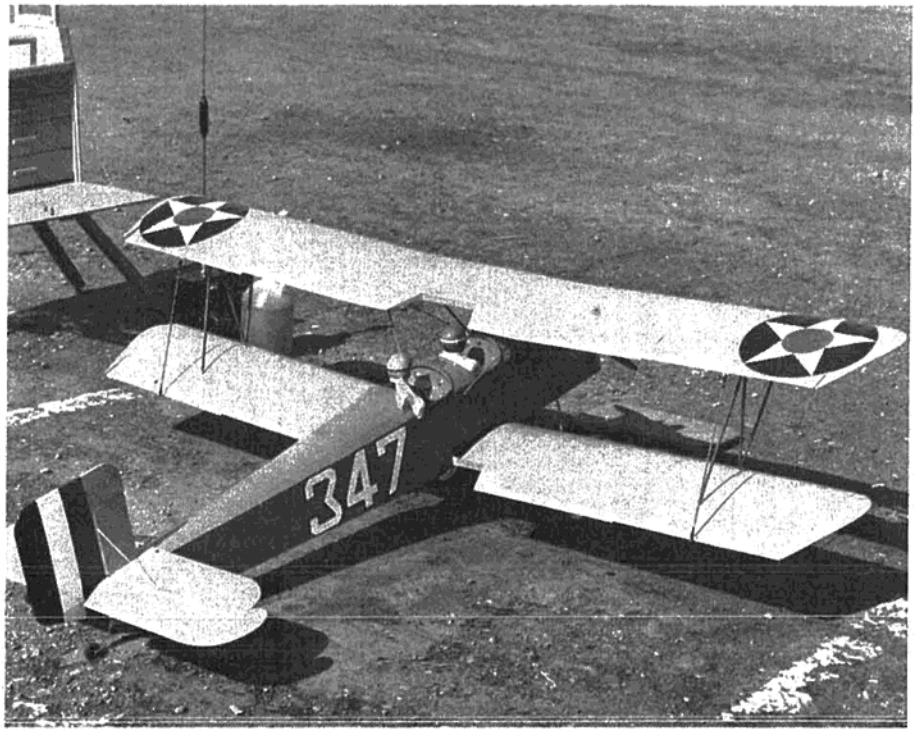
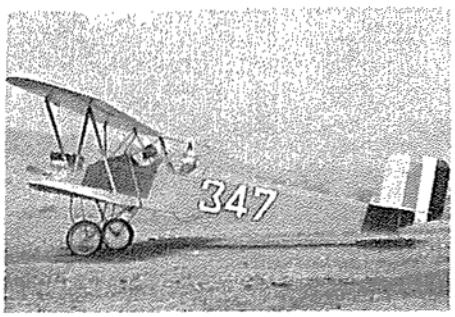


LIST OF MATERIALS

SHEET BALSA	
1 — 1/16 x 4 x 36 HARD	Trailing edges.
7 — 1/16 x 4 x 36	Ribs, sheeting, caps.
4 — 3/32 x 4 x 36	Tail surfaces, ribs, tips.
3 — 1/8 x 4 x 36	Formers, spars, hatch, fill sheeting.
1 — 3/16 x 4 x 36	Spar reinforcing, tail parts.
2 — 1/4 x 4 x 36	Doublers, formers.
1 — 1/2 x 4 x 36	Doublers.
STRIP BALSA	
3 — 1/4 x 3/16 x 36	Tail spars.
10 — 1/4 x 1/4 x36	Fuselage framing, tail spars.
5 — 3/8 x 3/8 x 36	Leading edges.
BLOCK BALSA	
2 x 2 x 4	Tail block.
3/4 x 3 x 5	Top rear deck.
1 1/2 x 3 x 36	Top nose, engine.
PLYWOOD	
1/32 x 12 x 48	Fuselage sides.
1/16 x 6 x 6	Nose plate, reinforcing.
1/8 x 12 x 24	Dihedral braces, former, plates.
1/4 x 6 x 12	Former, inserts.
HARDWOOD	
3 — 1/16 x 1/4 x 36 Spruce	Top stringers.
20 — 3/16 x 3/16 x 36 Spruce	Wing spars.
2 — 3/8 x 3/8 x 12 Maple	Landing gear mounts.
2 — 3/8 x 1/2 x 12 Maple	Strut & wing attachments.
3/8 x 3/4 x 2 Maple	Tail skid mount.
4" of 3/16 dowel for elevator joiner.	
4" of 1/4 dowel for wing pins.	
HARDWARE	
1 — 3/16 Dia. x 12 Alum. tube	Tail brace.
6 — 1/4 Dia. x 12 Alum. tube	Wing struts, exhausts.
2 — 1/16 I.D. x 12 Brass tube	Aileron couplers.
1 — 3/32 I.D. x 12 Brass tube	Strut & landing gear ends.
1 — 7/32 I.D. x 12 Brass tube	Strut lugs.
1 — 7/32 O.D. x 12 Brass tube	Strut lugs. (Optional)
1 — 5/32 x 36 Piano wire	Landing gear.
1 — 1/8 x 36 Piano wire	Landing gear.
2 — 3/32 x 36 Piano wire	Landing gear, cabane struts.
1 — 1/16 x 36 Piano wire	Tip skids.

Control linkage and small hardware as noted on drawings or to suit.

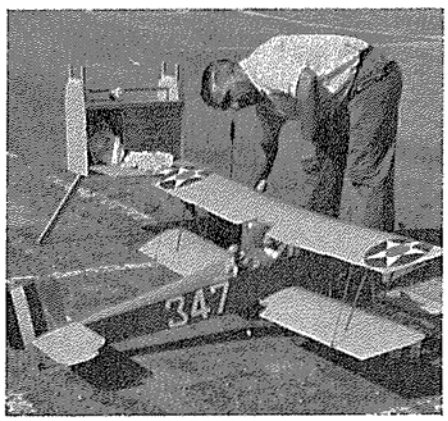


CONSOLIDATED PT-1

(Continued from Page 17)

A special word must be said about the aileron linkage. Only the bottom ailerons are driven, the top ones being coupled by rods at the trailing edges. Due to the load hanging on the linkage, any slop or give in the coupling from the aileron to the bellcrank will cause sagging and fluttering. For this reason the bellcrank is made from thick material which will not twist. The push rods are thicker than usual and connect to thick horns. All pivots must be free but with as little play as possible. The regular wire connections to the servo are satisfactory if the guide holes in the ribs are kept small in order to prevent the wire from bowing. With the proportions shown in the linkage the ailerons will have the required range of motion with the average throw between limits of present servos. The movement may seem excessive to some people but is a compromise between much larger ailerons and a sluggish response. It works fine in flight.

Rigging is best left until after covering so you won't have to cover over all those strut lugs. The entire model is silk covered. One little trick makes the wings and tail an easy job. With the sheet cores used in the tail the silk is certain to try and stick down between the ribs, making horrible looking pockets. To avoid this the wood is first given the usual one or two coats of clear dope to lay the grain. Then, when this is dry, the edge areas where the silk might stick down are given one or two coats of wax. A liquid wax is very good and can be applied with a brush to the exact



areas required. Don't forget to leave the very edge clear of wax so the covering will stick where it is supposed to. The same thing applied to the wings, the spars being waxed between the cap strips to prevent the silk from pulling down. As you can see from the photographs the results are worth the effort. There is not a sign of "pocketing" or sagging of the covering.

Rigging the wings is not difficult if you get the initial set up well organized. Secure the bottom wing in place and rest the model on two identical strips of wood under the center section so the wing sits flat. The top wing is then attached to the cabane struts and cardboard jigs used or measurements made to set the top wing at the 2 degrees positive angle of incidence. The trick here is to epoxy the lugs into the maple blocks with a slow setting epoxy and get the rigging adjusted before the goop hardens. This way the lugs can slip a little in their sockets to make up for any little goofs in construction, the rigging angles being the important thing. The same thing applies to the outer struts. With the bottom wing supported level on blocks under the strut positions the lugs are inserted with wet epoxy and the struts attached. The top wing is then adjusted to the proper incidence angle and held in any suitable manner until the epoxy sets. Once fixed, the whole mess can be torn down and rebuilt any number of times without disturbing the rigging.

While the wings are all blocked up it is a good idea to mount the tail assembly and get the leading edge packing block right. Then you will be sure everything lines up.

The authentic color scheme is quite simple. The fuselage and fin are the standard army khaki-green (ugh), while the wings and horizontal tail surfaces are trainer yellow. Scale markings are shown full size in position on the drawings, so you won't have to do a lot of measuring and calculating from small 3-views. No scale model looks like much without a pilot and the PT-1 looks better with two. The largest plastic ones available are not bad, but even better are hand carved ones like Lou Proctor shows in his Antic kit. It is a real sight to see the PT-1 cruise by at ten feet with pilots' scarves fluttering in the breeze.

Other than the usual ground handling characteristics of a narrow wheel track biplane with large wing area, flying is no real problem. Even with the small tail area the tail will come up nicely on the take-off run and the bird will lift off in a short distance. Do not expect class 3 contest performance, but it will do a lot more than just putter around at low speed. With all that wing area it may tend to float when landing into a stiff breeze, so keep it well down on the approach. It is very stable at low speed and will not tuck under unexpectedly.

So, chocks away and watch out for Snoopy.