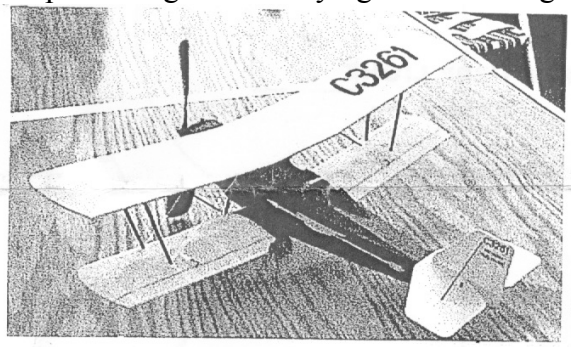
THE CASE FOR THE BIPLANE
by Dave Stott

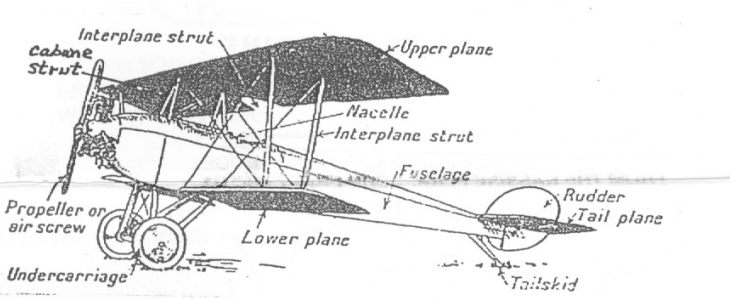
This article was originally published in the May/Jun 2007 FAC News. Dave loved to build bipes. and thev were invariably models that knocked your socks off in appearance as well as in flight performance. Read on and learn the many advantages of going with a two-winger-- Editor.

We all know that a biplane has a lot more stuff hanging in the breeze that creates quite a bit of drag besides the extra wing itself. We also know that drag increases by the square of the speed. That is, if a model has 4 square inches of flat plate drag area at a speed of 10 mph, then at 20 mph it will have a drag of 16 sq. inches of flat plate area. Don't run away! We will not get into anymore math here. This relationship simply tells us that you are better off flying a high drag model slowly. How is this done?

As in building any other model, lightness. The biplane has a greater wing area than a monoplane of the same span. Though the weight of an extra wing and struts are carried, the wing loading is always less. Less wing loading means you do not have to fly as fast, hence drag is lessened. There are other factors to consider, too.

We all know that stability is a greater contributor to higher climb and longer flights. The smoother the flight path, the better. No propeller turns are wasted in trying to pull the model through a power stall. We also know that any given airfoil has an ideal angle of attack at which to fly that gives the best lift over drag ratio. Many monoplanes, especially low wingers, need to have the wings washed out near the tips to improve stall recovery. When the center portion of the monoplane wing stalls, the washed out areas near the tips are still providing lift, and a complete stall never occurs. But, at all times the complete wing is never flying at its best angle of attack. This is loss of efficiency.





LEFT: DAVE STOTT'S PITCAIRN FLEETWING MODEL. A VERY GOOD FLYING BIPLANE KITTED BY EASYBUILT MODELS.

Though some high wing monoplanes are stable enough without washed out wings, the stabilizers must, more often than not, be of increased area to achieve stability. The additional size of the tail adds weight far aft of the CG, just where you don't want it. In most cases, it must be countered by ballast in the nose. More weight!

A carefully set up biplane suffers none of these requirements. An ideal incidence arrangement for a biplane is to have the top wing set at 1 degree more incidence than the bottom wing. Experience has indicated that 1/2 degree is just as workable and creates less drag. This set up allows the top wing to stall before the bottom wing, thereby effecting a quick recovery from any stall tendency. This is especially true in'biplanes with positive stagger. That is, with the top wing set slightly forward of the bottom wing. No wash out is needed, therefore both wings fly at an ideal angle of attack. And, almost all of them will need an over scale size stabilizer.

The powered portion of flight of a biplane is certainly less efficient than that of the monoplane, even

though it does not require a high speed. The biplane prop should have more blade area than a monoplane prop for the same size model. It needs this for a better bite to overcome the additional drag.

The glide portion of biplane flight is a wonder to behold. The altitude is steeper than the monoplane, but its speed is lower, producing a slow rate of descent. Unlike the monoplane, the biplane seldom will climb a bit as it turns into the wind, but possessing a lighter wing loading, it is possible to pick up some good air quite easily.

No, the biplane is not as efficient as the monoplane. That's why it gets FAC bonus potnts. But, it is not as bad as you might think for the reasons given above. In flight it is a sight no modeler should deny himself of having created.