January 29, 2017

WNYFFS January 2017 Update

Our Planning Meeting for this year's outdoor contests went very smoothly this year. There were very few changes to the events flown at the contests. Flyers for the Empire State Free Flight Championships and Pirate Challenge are included with this update. Roy Smith has already sent out the flyer for the GGG. There is no flyer for the Spring Opener; that is a chance to practice fly. Both dates for the Spring Opener are available for practice flying even if there is no rain on the primary date. PDF versions of the flyers will be posted on the web for your convenience.

While at the Planning Meeting, we have a good deal of time for discussing many other topics besides the contests. That is part of the pleasure of these meetings between flying seasons. One specific topic Lyle Whitford and I discussed was pop up and pop off wings for DT operation. Many people have asked about pop off wing DT at contests.

Outdoor Free Flight Dates at NWM Flying for 2017:	
Spring Opener:	May 6 & 7
Spring Opener Rain Date:	May 20 & 21
FAC Outdoor Nationals:	July 19 ~ 22
Empire State Free Flight Championships:	August 11, 12 & 13
Pirate Challenge:	August 25, 26 & 27
Great Grape Gathering:	September 8, 9 & 10

A pop off wing is particularly desirable on small light models such as FAC Embryos. Those models are sometimes so light that when a pop up tail is activated, the model fails to descend in a strong thermal. In addition, pop up tails are sometimes hard attach reliably, especially if the model has a narrow cross section near the tail. This is the case with the FA Moth and many Embryo models. A pop off (or pop off) wing allows one to attach the tail feathers securely once the desired incidence has been achieved.

Incorporating a pop off wing DT as described in this update will use as the primary example an embryo model. This technique has been used on models with greater wingspans such as the FA Moth with almost no modifications. It has also been used on an E-20 model but some work is still required to adjust the way the model descends. On an E-20, with so much weight (relatively speaking) concentrated in the motor and battery, the E-20 model can too easily fall nose first. The attachment of the wing to the fuselage in the dethermalized state must be adjusted so the tail does not force a nose down descent.

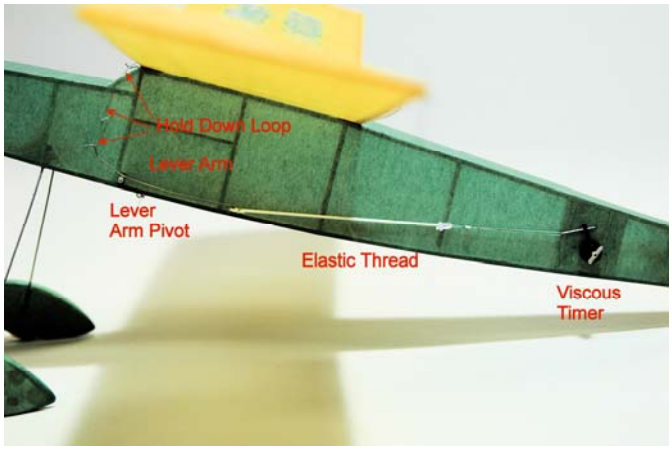
Building a Pop Off Wing DT

Perhaps the simplest means of implementing a pop off wing DT is to use rubber bands (more or less) in the classic fashion to hold the wing on the top of the models fuselage. Building in a fuse type DT into the top surface of the wing allows the fuse to burn through the retaining bands and release the wing. Ideally, only one rubber band is used; this makes it more likely that the fuse will burn through and release the wing. One clear advantage to this configuration is that the fuse is on top of the fuselage so that in the event the DT is not activated, the fuse is unlikely to contact the ground.

This is essentially how the DT was set up for the electric Kiwi E-20 except that the fuse was moved aft of the wing. This was necessary to allow room for extra fuse in the fuselage. See photo on right.

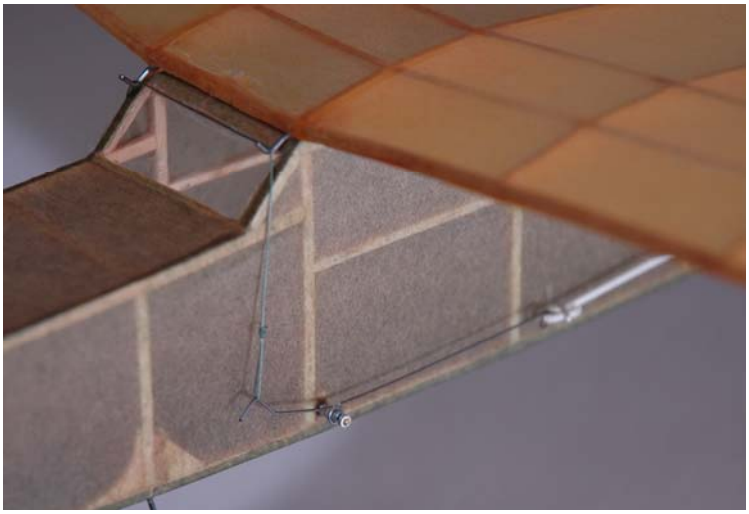
Fuse DTs are implemented on only a small number of models in my fleet. Most DTs are implemented using viscous timers of one sort or another. Installing a viscous DT in any fashion is more complicated than a fuse type. Triggering a pop off wing required a bit of head scratching since I hadn't seen it done before. In hindsight the whole thing is really simple once it is done, though it is a bit hard to describe without pictures. Most of the pictures that follow are of several Pumas built (and lost) over the years.

Among the first considerations in designing a pop off setup is to consider how the wing will be held to the fuselage. We do not want a large number of attachment points; the viscous timer provides a single restraining force and the restraining force is fairly light. A second consideration is how to make sure the wing disengages positively from the fuselage once the DT is activated. This latter consideration is really quite easy to achieve since the wing is providing lift while everything else is pulling down. The simple way to attach the wing to the fuselage is to build a tongue on the trailing edge of the wing which slips beneath the first cross piece on the fuselage. Holding down the front of the wing is accomplished by the tensioned line of the viscous timer. Redirecting the force is a bit tricky but the system described here works well. Note that it is also desirable to include keys on the



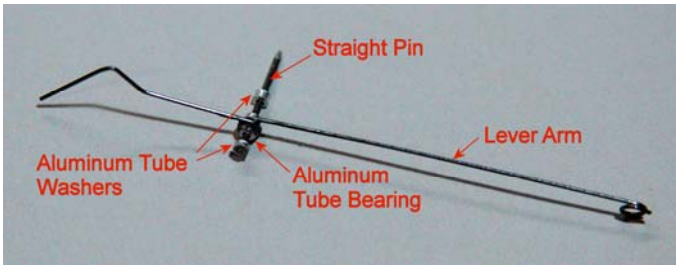
bottom of the wing forward of the center so that the front of the wing remains centered on the fuselage. Assuming the tongue is correctly sized, it will center the rear of the wing.

As noted earlier, the holding force available from a viscous timer setup is limited. In order to provide greater restraining force, the setup shown uses a pivoting lever arm. One end of the arm is longer than the other. The elastic thread used to run the viscous timer is attached to the longer arm. The shorter arm has a hook in it so that a line can be looped from one side of the fuselage over the top to the other side. This loop is what holds down the leading edge of the wing. This difference in lever arm lengths produces a greater holding force than is provided in by the tension of the elastic driving the viscous timer. The lever arm is made of fairly light music wire so it provides some compliance. Even so, additional compliance is needed in the hold down loop so part of the loop is made of elastic thread. This additional compliance makes it easier to set up the system before flight.



Some feature is also needed on the leading edge of the wing so the hold down loop will have something to "hold on to." It is easy enough to bend up little hooks but even easier to use very small straight pins. When the tiniest of sizes, those about ½ inch long, the pins are fine enough at about 0.020" to push into the front edge of the wing's ribs. A small area of the front of the rib can be doubled to insure enough "meat" for the pin to enter without splitting the rib. These pins can be installed after the wing is covered and finished.

Making the lever arm is a fussy task but the materials are minimal so it doesn't hurt if a second try is required. The moment arm is made from 0.020" music wire. Ratio of the long to short is not critical, try for about 2 or 3 to 1. For the Puma, the arm is about 2-1/2 inches over all. The pivot of the lever arm is formed by twisting a loop. It may be possible to form the loop so it rides directly on the pin but in my efforts that turned out to be a bit too wobbly. Instead, a bearing made of a very short length of 1/16" aluminum tubing is used instead. Getting the formed loop to fit snugly on the bearing tube is the fussy part. Try forming the loop and seating it on the bearing first and then forming the long and short ends of the lever. It took several tries the first time. In addition, two aluminum washers are cut from the same 1/16" tubing. The inner one keeps the arm from rubbing against the fuselage too much and scoring the tissue. The outer washer is crimped on the pin to insure the pivot bearing does not ride onto the head of the pin.



Mounting the arm to the fuselage is very simple. A bearing block made of thicker and a little heavier balsa is put in place as a crosspiece resting on the longerons so the end is flush with the side surface where the pivot is to be located. Location for the pivot is selected so that the hook end of the arm is beneath the leading edge of the wing. That way the retaining loop comes straight down. Installation of the arm is done by pushing the pin into the bearing block after the fuselage is covered and doped.

When you're ready to fly, hooking up the lever arm can be a bit tricky, especially on a small model. Begin by attaching the elastic to the viscous timer. Now the lever arm is held in place. Next, slip the holding loop over the fuselage and attach it to the lever arm. Now, carefully lift the holding loop over the holding features on the wing. This is the hard part because the holding force for the wing should be relatively high and thus there is limited compliance in the system.

Finally, don't forget the wing must remain attached to the model when the once the DT is activated! A swivel is also essential for this attachment as the fishing line used will quickly become so twisted that it is difficult to attach the wing for normal flying. The final photo shows the hold down loop and the wing retainer line using the same attachment point. On that version of the Puma, a rubber band in the hold down loop provided the necessary compliance to make attachment easier. Later versions use an elastic thread loop which lasts longer than a rubber band. Note also that the swivel should work better if it is attached to the wing, rather than to the fuselage as shown here.

That's all for now.
Build light, build straight and fly often,
Mark C. Rzadca, Editor, Western New York Free Flight Society Thermal Journal