

ENGINEERING STAB DTs, SOME IDEAS

By George White

I recently looked through the many photographs given me by some very talented model builders of their DT schemes. I believe those ideas are too good not to share with the readers of this rag. Although there are a couple of good ideas in the Articles Index of our website www.pensacolafreeflight.org, there are still more to share.

One of my early, non-scale models was the JA Skokie. Since it was non-scale, it seemed OK to have the stab activation hardware on the exterior. I merely dropped the fuselage longeron about 1/4" where the stab was to mount, then used rubber bands attached to the rudder to tilt the entire tail assembly forward. The older boys have always warned me that anything less than a 45° tilt results in an ineffective DT.



I put a strip of 3/32 hard balsa on the bottom center of the stab which ran through a slot in the bulkhead at the front of the stab. This kept the stab leading edge in place. The rear of the same 3/32 strip also served to keep the stab centered when it was pulled down.



A very short piece of 1/8 aluminum tubing was crimped onto the pull-down line to act as a stop to prevent the entire tail from tilting forward more than 45°. It hits another short piece of 1/8 tube CA'd to a bottom longeron, through which the pull-down line runs. The crimped tubing and the CA'd tubing can be seen in the following photo.

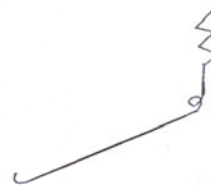


There are many types of line you can use for pulling down the stab. I use something called "backing" which is an extremely light, very flexible braided line used by fly fishermen. To ensure the tail is pulled down nice and tight without interfering with the action of the button timer, the pull down line is wrapped around a 1/8" dowel peg and then on to the spring for activating the button timer. I've found that an 18" long piece of .009 music wire around a 1/16 mandrel makes an ideal spring for activating the button timers. (See articles on "springs" in the articles index of www.pensacolafreeflight.org) If you choose to use a fuse, don't forget that AMA prohibits the use of fuses on the bottom of airplanes. It tends to set the flying field afire and causes great puckering!!!

I later learned that Tom Hallman, one of the most creative and skilled scale builders, used a scheme by which a spring pushed the tail assembly up into DT position. After seeing what he did, I used the idea on the Rocky Top Howard DGA. I put a plate on the bottom of the stab and glued a couple of strips as you can see to create a channel for the spring wire to travel in.

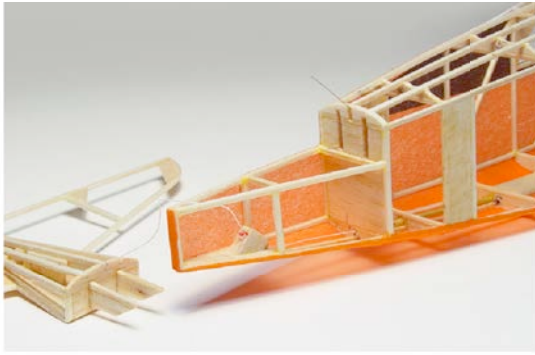


The spring which kicks up the stab is made from .015 music wire, shaped as below. The zig zag portion is sandwiched between two sheets of balsa with Duco and fixed to a bulkhead below the forward edge of the stab.



The top of the stab (shown above) is also sheeted and a nylon hinge (difficult to see in these photos) found in RC model supply houses is used to attach the tail assembly to the fuselage. A 1/8X1/16 stick is installed as a base for the rudder. Also visible in the photo is a hole in the bottom of the fuselage through which the pull-down line will be run. The same setup leading to the button timer is used here as discussed above.

Still another pop-up tail technique used by Tom Hallman in a Fairchild 24 uses the same spring to kick up the stab with the rudder attached. Tom's method of holding the stab on the fuselage, both in the down and up position is shown in the photos. The two "prongs" shown will not only hold the stab in place in both modes, but will also prevent the stab from moving laterally in the DT position, avoiding a spinning descent.



two stab pieces to the fuselage, but instead of using an internal spring as I did, he uses an external spring lever on each side of the fuselage. The springs consist of .009-.012 music wire wrapped one time around the carbon fiber shaft on each side of the fuselage. The spring is shaped as follows, with the short bend turned 90° in order to strengthen its attachment to a diagonal or other support structure in the fuselage. The long arm slides under a very small tab on the inner surface of the stab. In the example, the short portion of the spring is CA'd to the diagonal, and the long arm is seen riding on the tab.



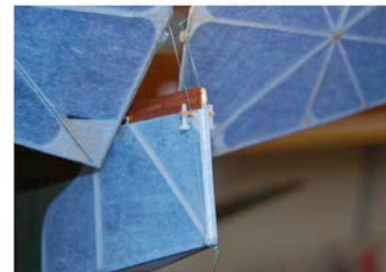
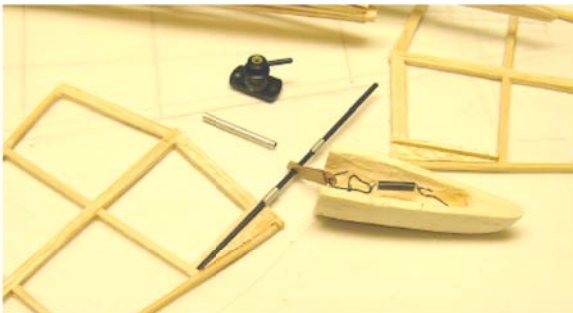
You'll notice that Tom, a man with "class," keeps his pull-down line inside the fuselage until shortly before it reaches the button timer. The use of a soda straw to shield it from the flailing rubber motor would seem a worthwhile thing to do.

Another technique said to be developed by both Don DeLoach and Tom Hallman by which the stab itself is rotated independently of the rudder or fuselage section. One variation is illustrated in the following photos of the stab arrangement on my Cessna 182RG. The photo shows the basic components.

I cut two 3/32 pieces of aluminum tubing to make bearings which are to be glued to each side of the fuselage, then epoxied a 1/64" ply pull lever in the center of a .050" piece of carbon fiber rod. Each stab half contained a slot for the carbon fiber rod, which is CA'd into the slot prior to covering. The spring anchored into the tail cone provided the power to rotate the stab. The stab is held down by a line attached to the other side of the lever and run forward, then through the bottom of the fuselage to the button timer. Note that the button timer is on the bottom of the fuselage. It didn't take long to realize that with no landing gear, the timer became a plow when the plane landed. I had to glue a clear acetate shield in front of the timer to prevent its destruction.



In the photo below, Don is using two pull down lines which are merged into one at the bottom of the fuselage. The carbon fiber axle is visible through the tissue on the left stab, and the tabs in which the long arm of the springs ride are also visible. Don also uses small nylon screws to allow adjustments to the stab incidence.



In the photo below, the late Paul Grabski's Keith Rider uses the same technique. The portion of the spring which attaches to the fuselage is very visible here, but Paul attached the long arm of the spring permanently to the stab rather than letting it ride on a tab as did Don. He attached it to only one side of the stab. Paul also has a very clever, non-conspicuous peg around which to wrap the pull down line, allowing the tension on the button timer to be independent of the strength of the kick-up springs on the stab halves.



An even better method of kicking up a stab independently of the fuselage was passed to me by Don DeLoach. He used the same scheme described above using a carbon fiber rod to connect the