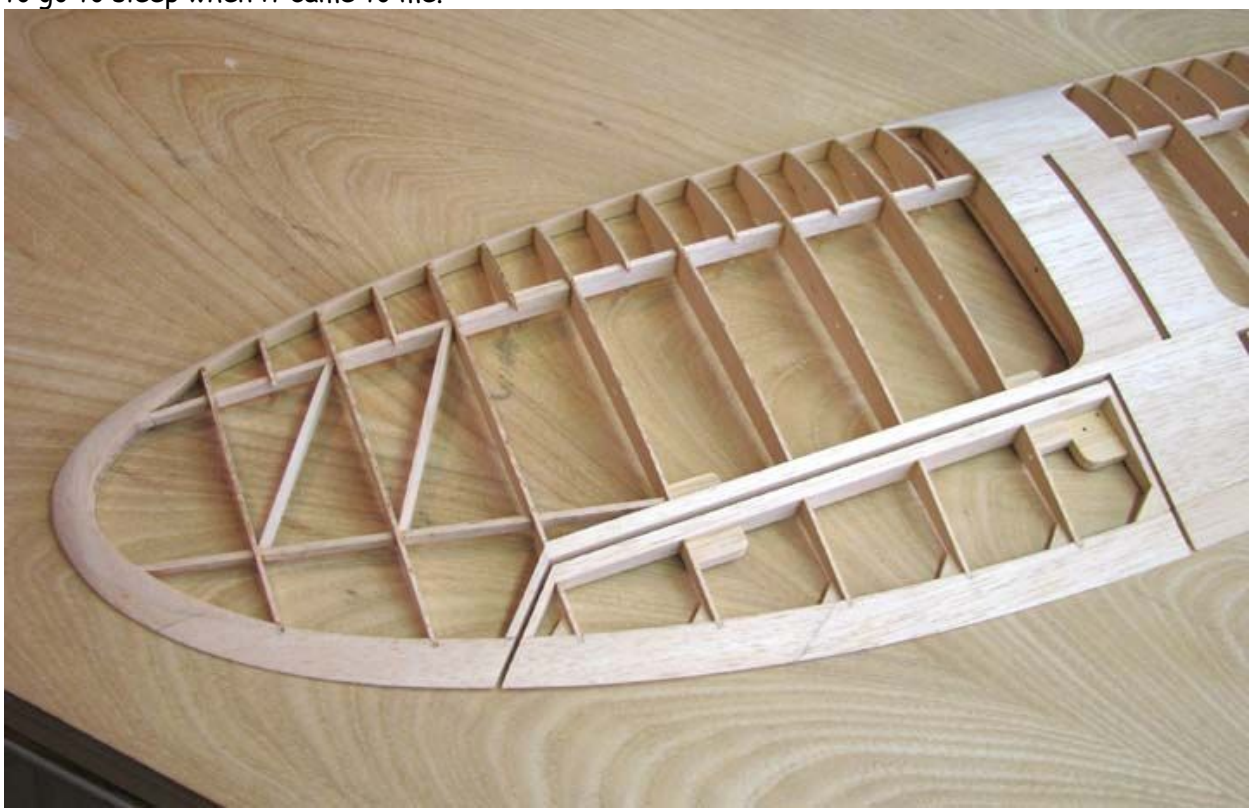
From: "Tandy C. Walker" <tandyw@flash.net>
To: "Walker, Tandy C." <tandyw@flash.net>
Date: 3/8/2009 4:14:22 PM
Subject: 56 (REVISED) Sailplane Elevator Hinge Wire Retainer

I received a question this morning from a modeler on my Sailplane distribution list. In Report No. 56, he was unclear as to just how the long elevator hinge wire gets installed and suggested that I make it more clear. In response, I took some additional pictures to help illustrate the narrative on how this is done, which I have included herein. If you are saving these reports, please delete the No. 56 and replace it with this No. 56 (REVISED).....Tandy

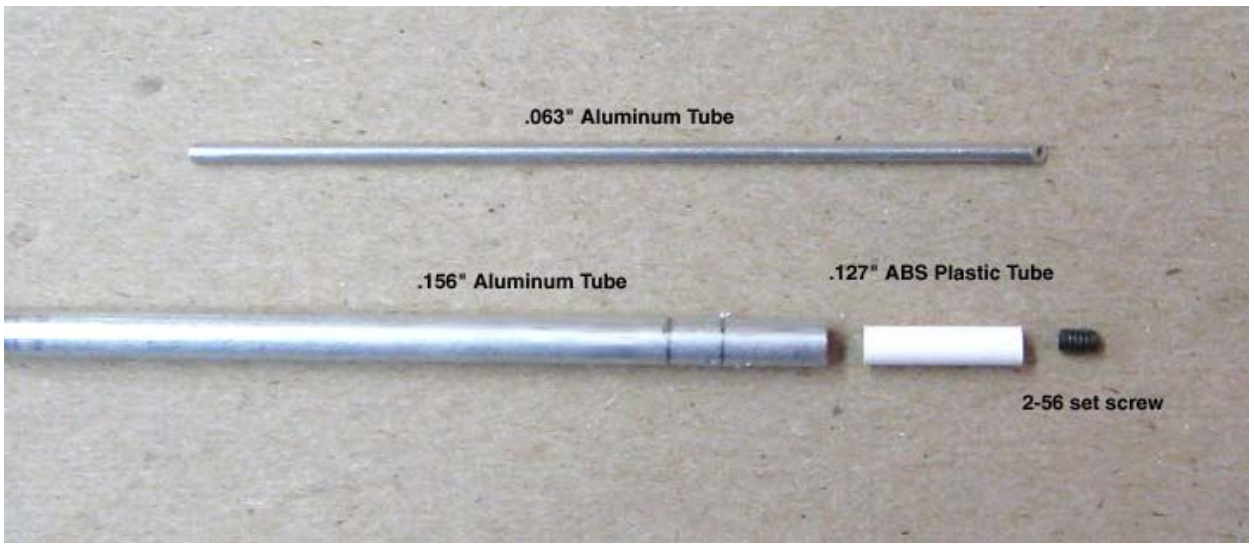
I got a one week reprieve on doing our taxes as my wife Sue has a number of "house things" lined up for us to do such as clean the tile on the kitchen floors and back hall, work in flower beds, go to the nursery and buy 36 Impatience (SP) plants and plant them, and shop for some area rugs. Therefore, this turned out to be a perfect time to solve a troublesome Sailplane problem that I have been wrestling with for some time.

Comet Sailplane Project

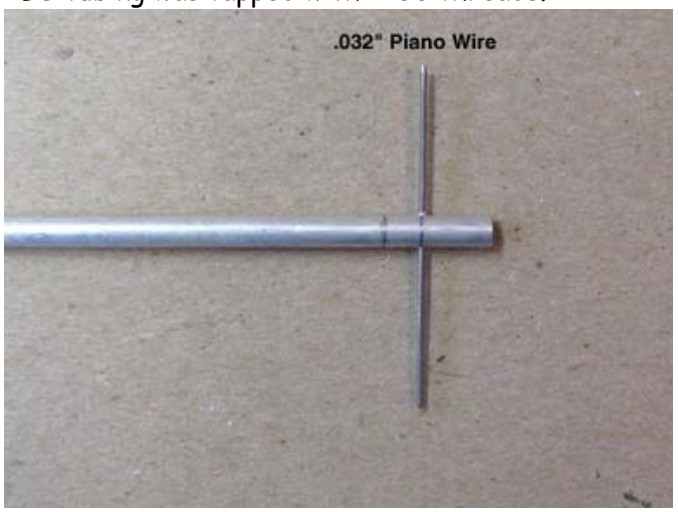
Ever since I decided to slant shape the elevator tip chord before reaching the tip of the stab as shown below, the retention of the elevator hinge wire on the Sailplane horizontal tail has reminded unsolved. I have been thinking about this all along, but a design concept never came to mind until the other night. I was in bed trying to go to sleep when it came to me.



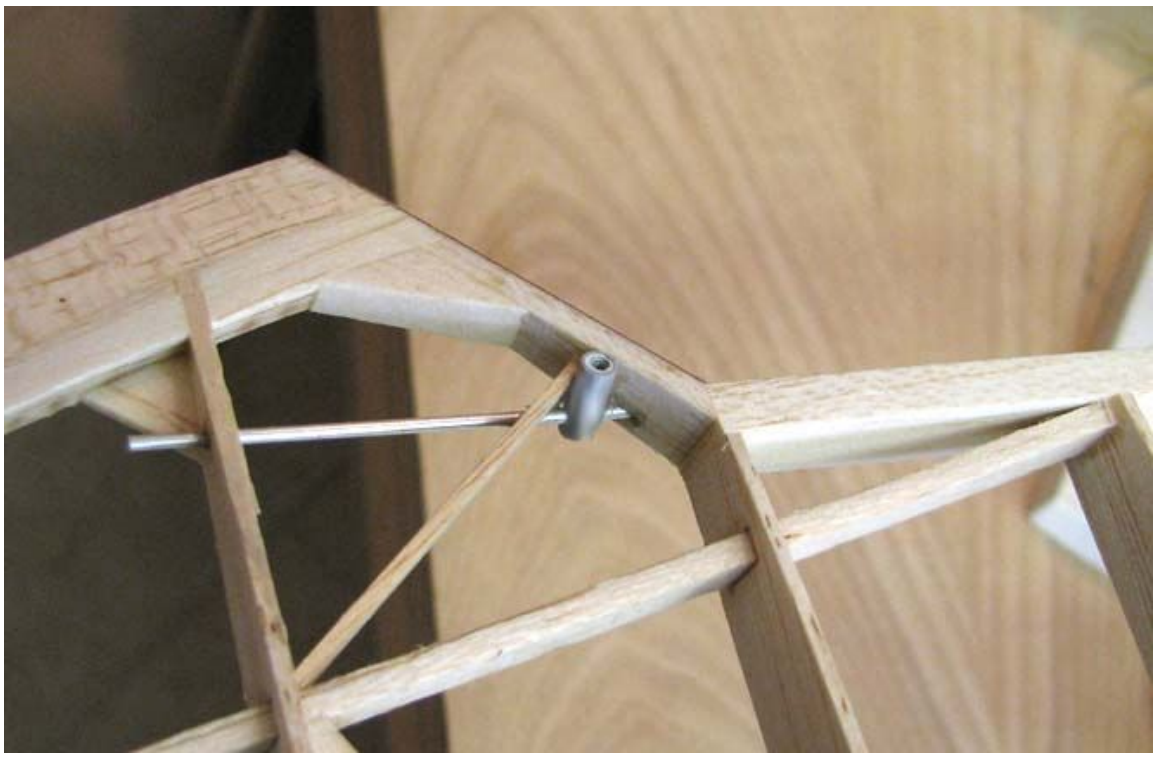
The components of the retention device are shown below. You need to know that the 1/2" long piece of ABS plastic tubing fits snugly inside the larger aluminum tube.



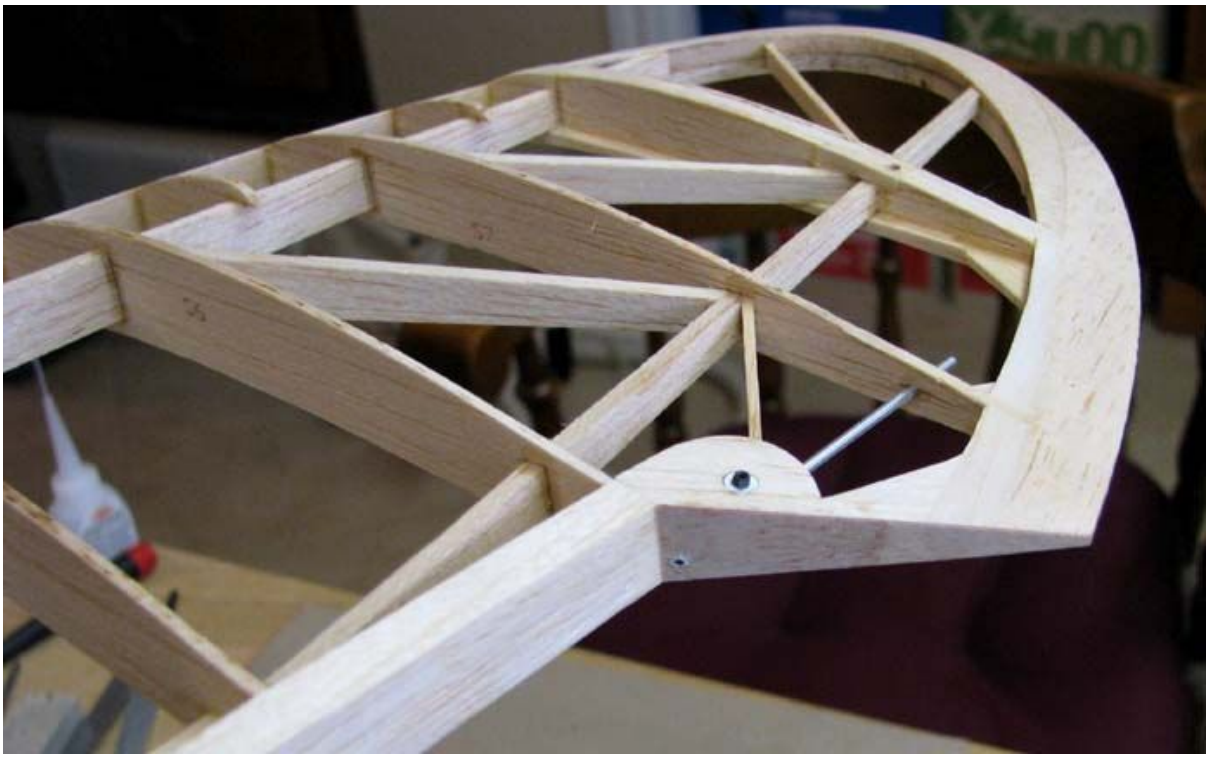
CA was applied to the outside of the ABS plastic tubing and slipped down into the larger aluminum tube and given a half turn to spread the CA inside. This bonded the two tubes together. Then the aluminum/ABS tubes were drilled diametrically through with a .032" drill bit so that the .032" hinge wire would slide through as shown below. Then the inner ABS tubing was tapped with 2-56 threads.



An .063" hole was drilled through the stab's root chord, diagonal brace, and the next stab rib. A piece of the .032" hinge wire was slid through the stab hinge and a short piece of the .063" aluminum tubing was slid onto the hinge wire. This was put through the stab's root chord and the aluminum/ABS tube slid onto the hinge wire and butted up against the .063" aluminum tubing. Finally another longer piece of .063" aluminum tubing was slid through the stab rib, the diagonal brace, and onto the hinge wire from the opposite direction and butted up against aluminum/ABS tube as shown below. The CA was very carefully applied to tack bond everything in place in the stab structure as shown below. The reason I said carefully was because you do not want the CA to get down between the butted tubes and bond the hinge wire inside. Now you can clearly see the design concept for retaining the hinge wire. Once the hinge wire is slid through the aluminum tubing, the 2-56 set screw is screwed down into the aluminum/ABS tube thus locking the hinge wire in place. There is significant friction between the ABS threaded tube and the set screw so vibration will not loosen the set screw.



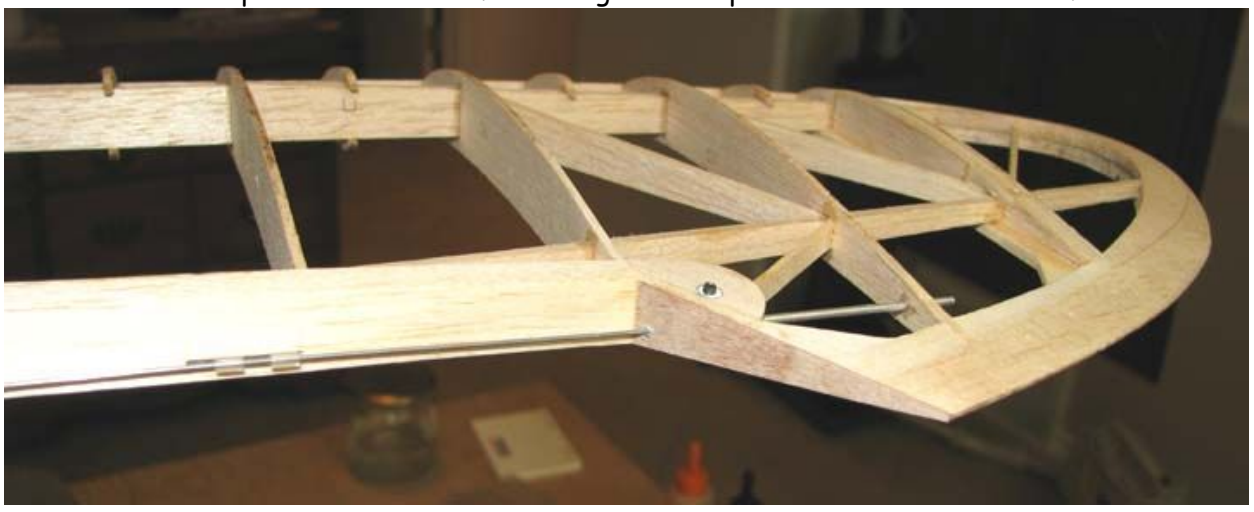
A round piece of 1/8" sheet balsa was glued on top of the stab structure with the aluminum/ABS tube projecting through as shown below. Notice the 2-56 set screw sticking out of the top. Also notice how the .063" aluminum tube was filed down flush with the stab root chord.



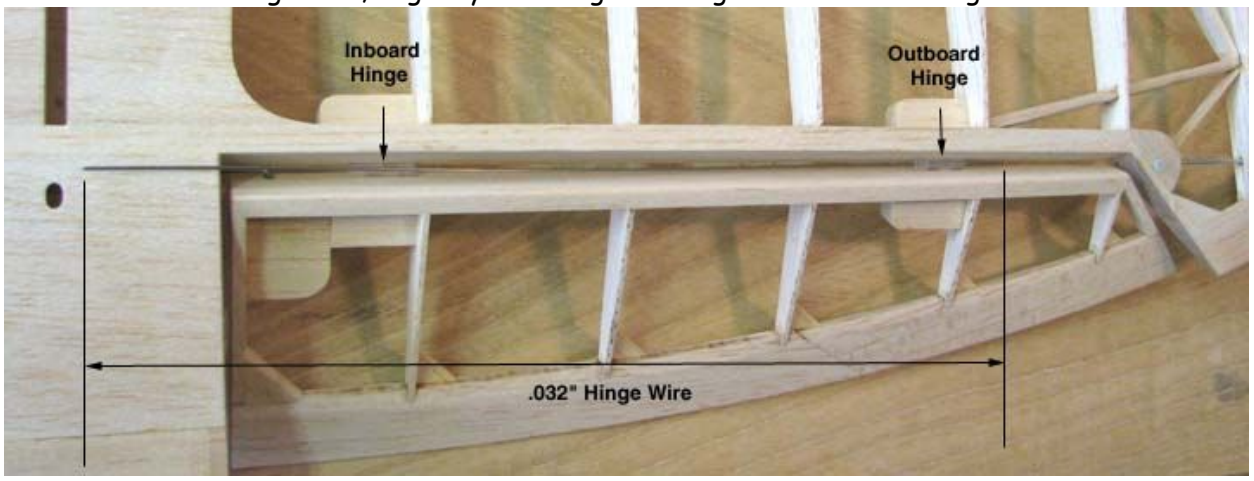
Another round piece of 1/8" sheet balsa was glued on the bottom of the stab covering the bottom end of the aluminum/ABS tube.

To insure that this entire retention device was locked in place, it was completely "potted" in epoxy as shown below.

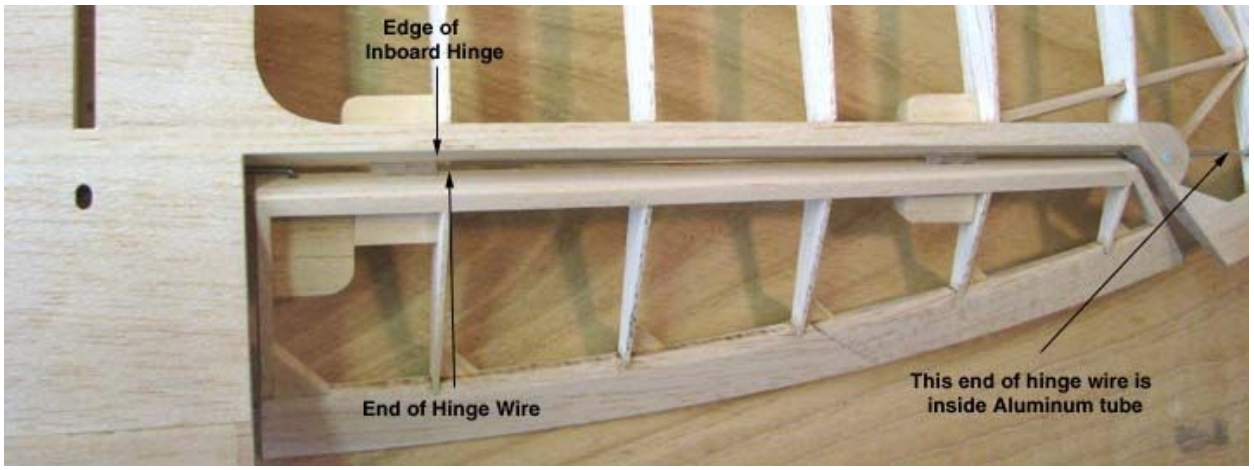
This picture shows the .032" hinge wire in place without the elevator.



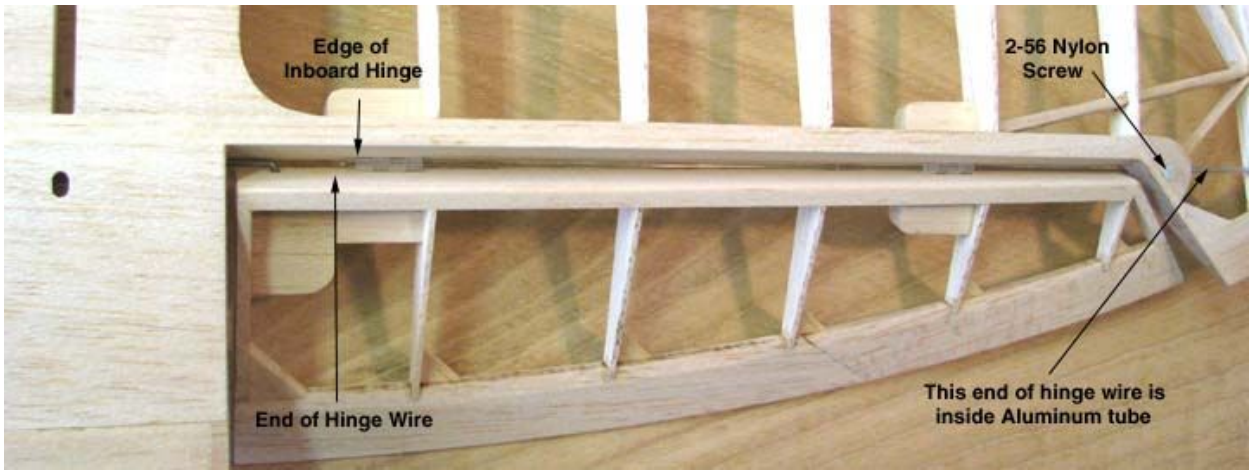
To install the hinge wire, begin by inserting it through the outboard hinge as shown below.



Next push the long hinge wire outward into and part way through the .063" aluminum tube until the left end of the hinge wire just clears the edge of the inboard hinge as shown below. Of course the right end of the hinge wire is inside the aluminum tube.



Then using tweezers, grasp the hinge wire and slide the left end through the inboard hinge far enough so that the end of the hinge wire is beyond the edge of the inboard hinge as shown below. The hinge wire is locked in place by screwing the 2-56 set screw tightly down against the hinge wire inside the aluminum/ABS tube. The hole over the set screw is sealed off by screwing in a short 2-56 nylon screw down against the top of the aluminum/ABS tube also shown below.



This is shot from the tip of the stab with the elevator installed.

This shows the whole right side of the stab with elevator installed. What a lot of work for such a small device.....Tandy