

## Addendum 2 to the Z-1 Build A Tow Hook and Grab-Tabs By Dick Odle – July 2011

Living by a beautiful flying site perfect for hi-start launching with a very so-so slope adjoining I thought a tow hook on the Z-1 would be pretty cool. Also good for calm winds! Others may agree. With time on my side (retirement you know) I elected to do it the hard but sanitary way.

Having tossed the Z-1 many times with a few CG and control set-up excursions I was comfortable with the tow hook placement. I should say, if you read it, nothing has changed from the initial set-up specified in my build discussion. The CG is at 1.5" from the TE giving plenty of pitch authority without being too twitchy and may move to 1.3" for better trimming characteristics as I smooth out a bit. The tow hook is designed to accommodate that change.

I started out with a piece of 0.038" 2024 Aluminum. I really wanted some dead soft stuff for the bend, but had none... so I just zapped it with a torch until fully annealed.

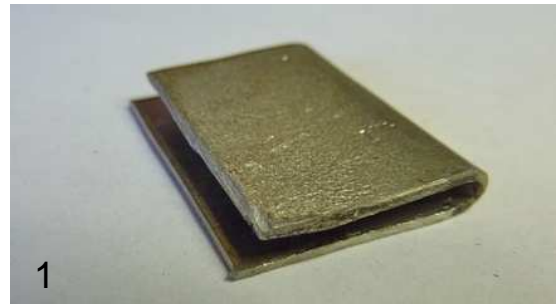
I measured the center rib as being ~0.087" thick, then found a chunk of 0.093" music wire that looked about right. The intent is to straddle the center rib with this little guy. Using my little bench vice, pliers, a hammer and lots of patience the bend was completed around the wire (Picture 1).

I cleaned up the part a bit, glued the wire in with CA, a sliver of balsa and baking soda. There will be little stress on the wire, so good enough. I then marked about where the wing surface will be, based on a quick sketch, and hacked the aluminum down to about where it will meet with the top wing skin (Picture 2)

I am putting this hook in shear against the center rib so thought a couple of holes to capture some epoxy resin wouldn't hurt. They are 0.125" in size (Picture 3). No, I did not calculate what a 0.125" column of epoxy resin is good for in shear. That is what thumbs are for. The part is now ready to install.

The sweaty part of this was finding the center rib. I sanded down the TE some and found (I thought) the rib, then using the stock tow hook drew lines in between. I got lucky. I used the Dremel cut-off wheel to cut slots on each side of the rib, then a #11 blade to hog out some epoxy and balsa from the wing join lines and finished the slots with a X-acto flat file down to (up to?) the top wing skin.

I taped off some stay-out areas, flooded the slots with heated 20 minute epoxy and shoved the hook in place. After about 15 minutes (time for the epoxy to settle, if at all) I wiped the wing/hook juncture with a paper towel to remove excess epoxy (Picture 4).



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Having really bad hands (Dupuytren's) I can't hold onto the Z-1 with 4+ pounds of hi-start tension... so I needed a fix. I figured some 1/8" plywood, shaped correctly and applied in shear to the wing trailing edge would get the job done. This can apply to a straight bungee launch as well.

Picture 5 shows the parts. They are 1" long and about 3/8" high, shaped as shown. After scraping away the paint I attached the tabs with CA glue and small baking soda fillets as shown in Picture 6. Being anal I will probably touch-up the paint. The bottom-side tab will not interfere with the tow ring coming off.

The red lines you see are 1, 1.25, 1.5 and 1.75 inches from the TE. The aft end of the Aluminum part of the hook is 1.87" from the TE. The wire is long enough to put on a 0.25" spacer, thus moving the tow point aft that amount. This tow hook location is intentionally conservative as I usually go right for the CG. We will see what is lost in launch height... but then gained in very safe launches.

The top-side tab gets the same treatment as shown below. You may notice I sanded a round in the wing TE to increase its thickness. I did this after the first few hand launches, discovering the stock TE was lethally sharp. The tabs now add lots of surface area making for very comfortable hand launches.

I applied the requisite names and phone numbers for when the bird gets lost in the weeds. Why the AMA charges an old guy 58 bucks to re-up after a decade is another story, but required where I fly now. At least the insurance is good.

