

10 August 2004

How to replace the ribbon in the Fountek JP3 tweeter



These are the tools needed to replace the ribbon. The slide gauge is not needed; any ordinary ruler will do. A scalpel (+ fresh blade) is great, but if you're good with scissors this will do. The "limstift" (Danish) is a glue stick. The plastic hammer is good but not necessary.



This is the tricky part. Two screw caps, here from some laboratory test tubes. I can't tell you where to get anything similar, but take a look around the supermarket and see if you can source anything similar. These have rounded

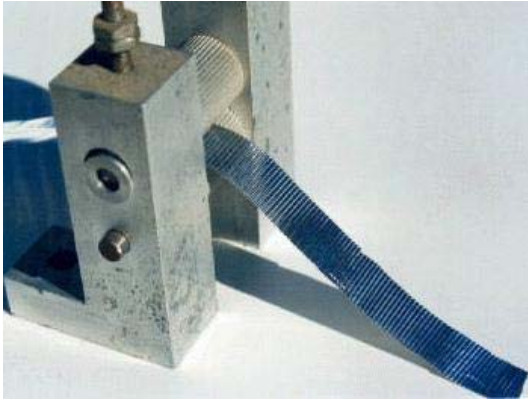
“waves”, which give – to my experience – the best elasticity in the corrugated ribbon. Very sharp bends appear to have less elasticity and we need a ribbon with some elasticity. Aluminium is definitely not a material that is characterised by having high elasticity



Household aluminium foil, 11 μm thickness. Cut some 8 mm wide strips of aluminium foil with the ruler and the scalpel.

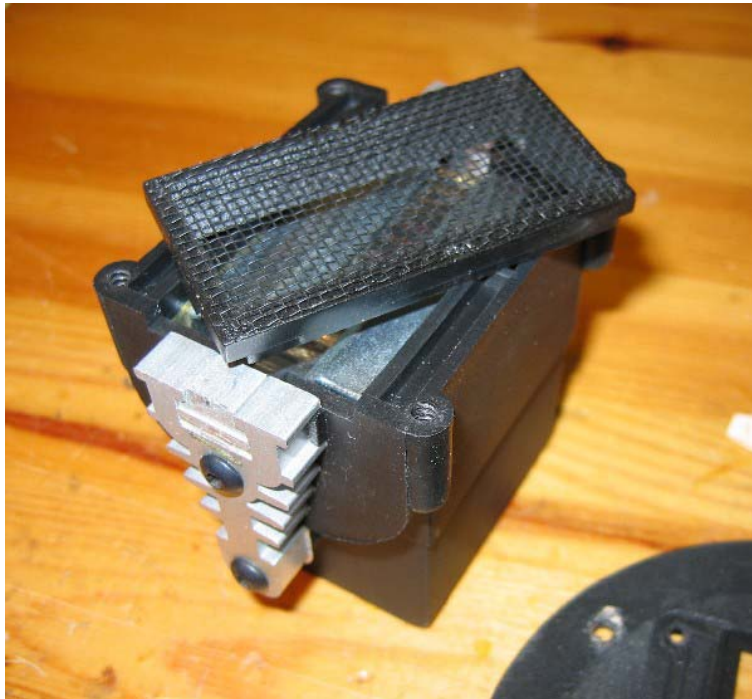


Corrugate the alu foil between the two screw caps as seen here. This takes some practice and people have produced all sorts of nice machinery for this, but we only have to corrugate 10 cm of foil, so this can all be done by hand as seen here.

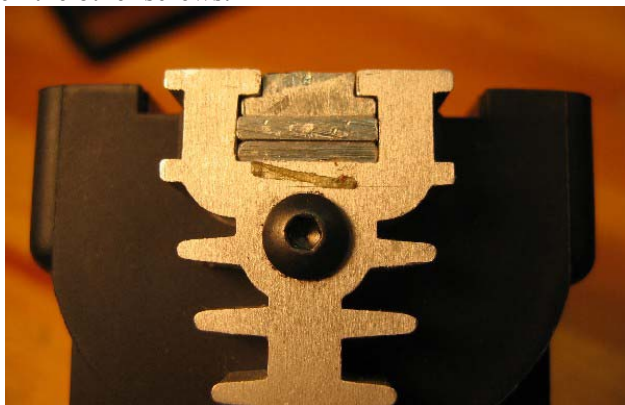


Here's a nice one somewhere from the web.

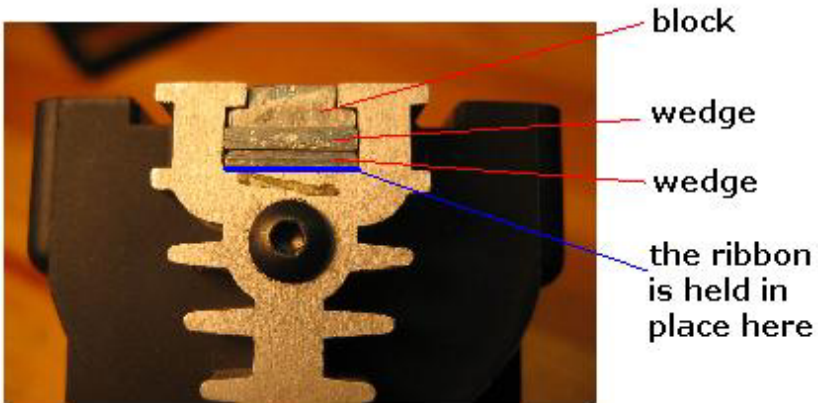
Believe me, the most ugly ribbons I have made have measured just as fine as the perfect ones. What is important is that you are able to gently stretch out the ribbon between the magnets without the ribbon touching them. There has to be just enough space between the ribbon and the magnets – on average something like max. 0.5 millimetre.



Dismantle the driver by removing the four screws that hold the faceplate. DON'T touch the other screws.

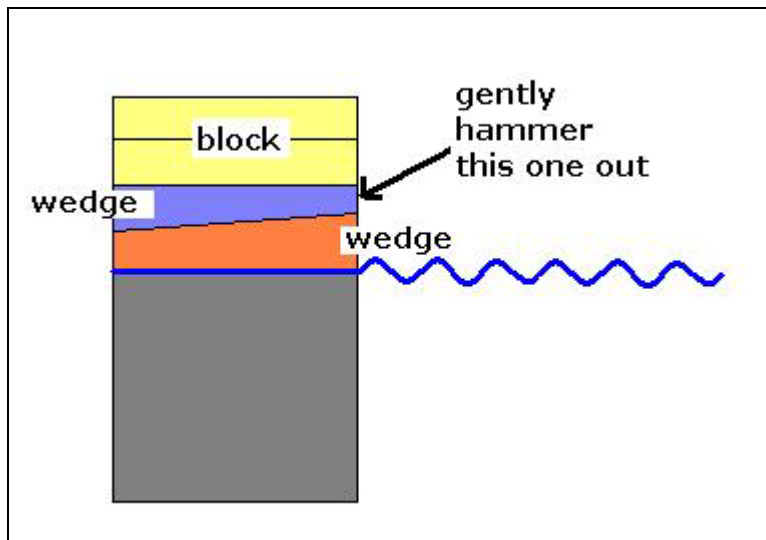


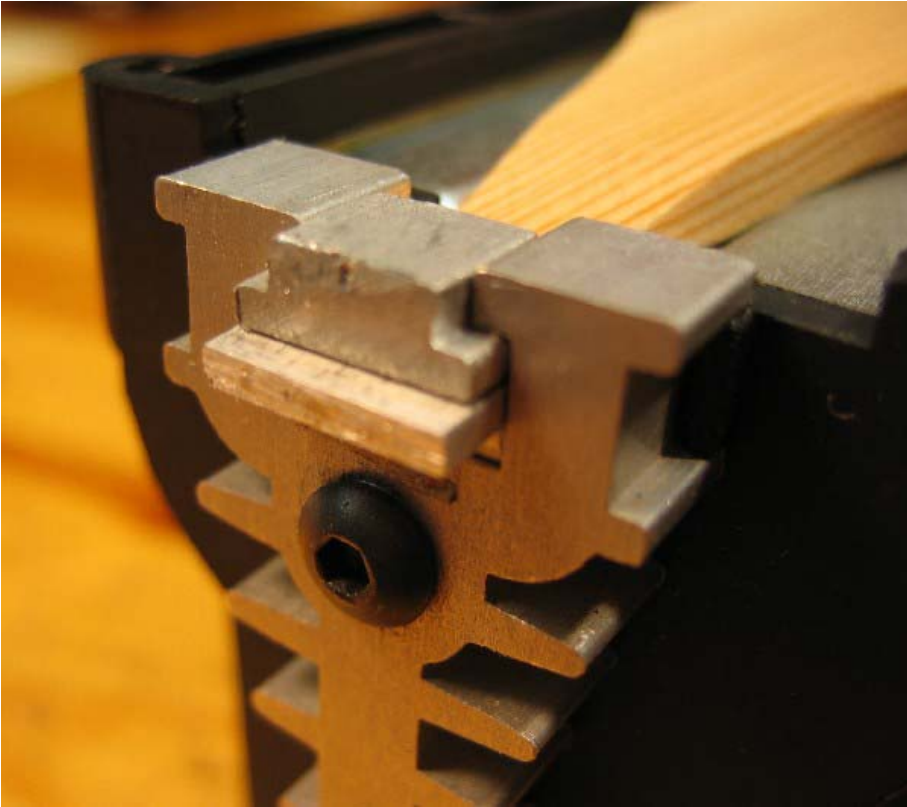
This is how the ribbon is held in place. Three small pieces of aluminium, where two really are wedges. Hard to see before they are free.



These neodymium magnets are killers! Any metal that can be magnetized will be sucked in, so use a wooden spatula to gently hammer out the wedge in the middle.

The aluminium block and wedges are oriented like this:

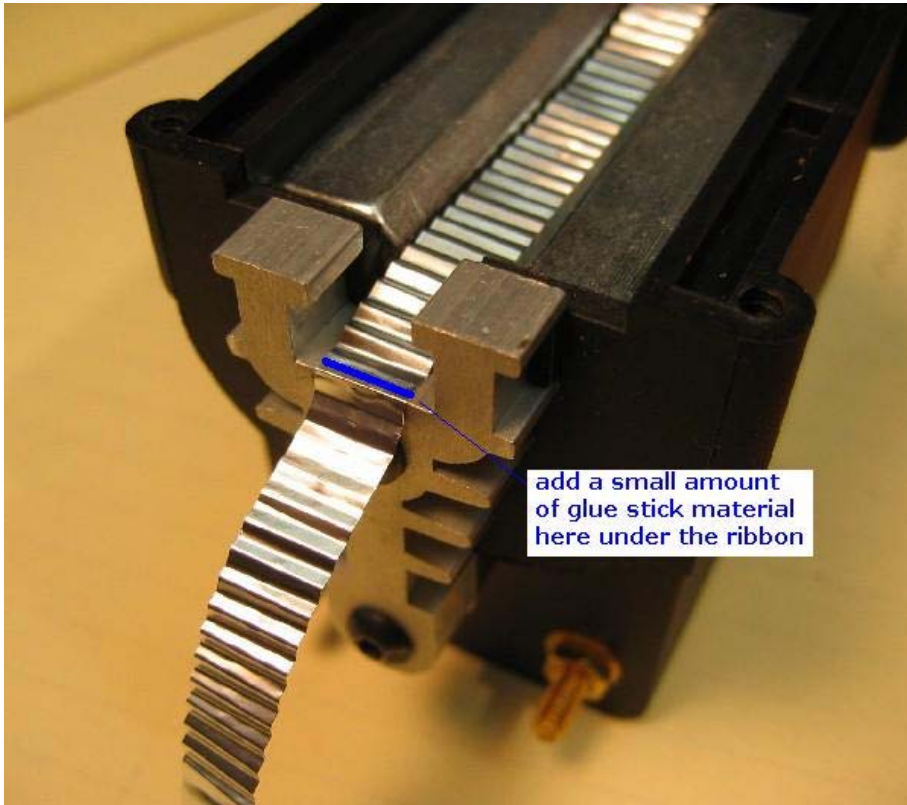




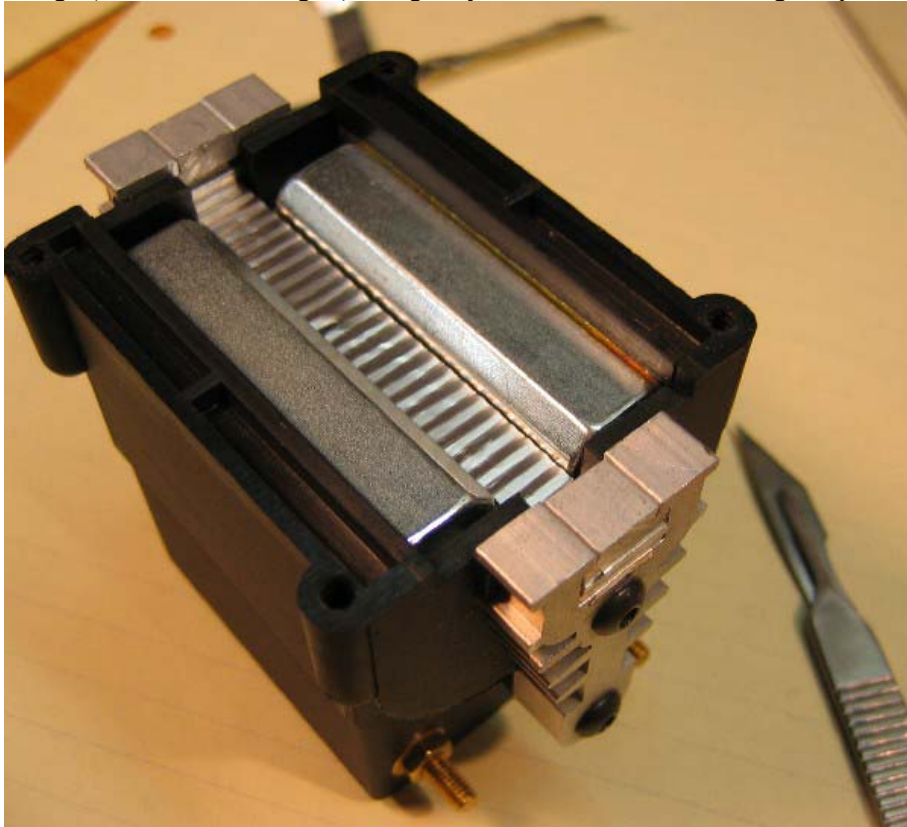
Here you see the upper wedge and aluminium block moving out.



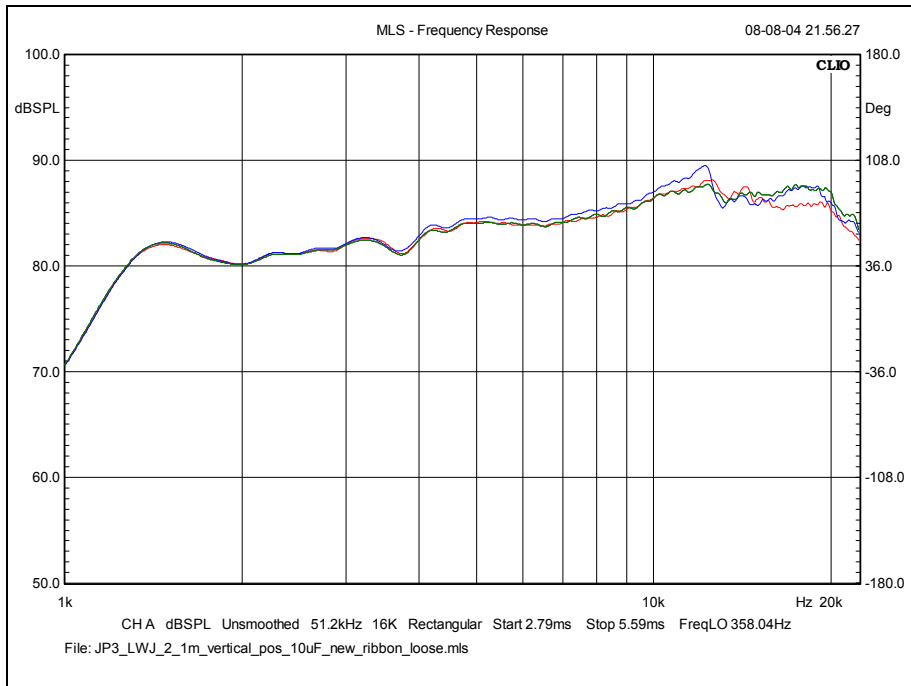
Remove the old ribbon.



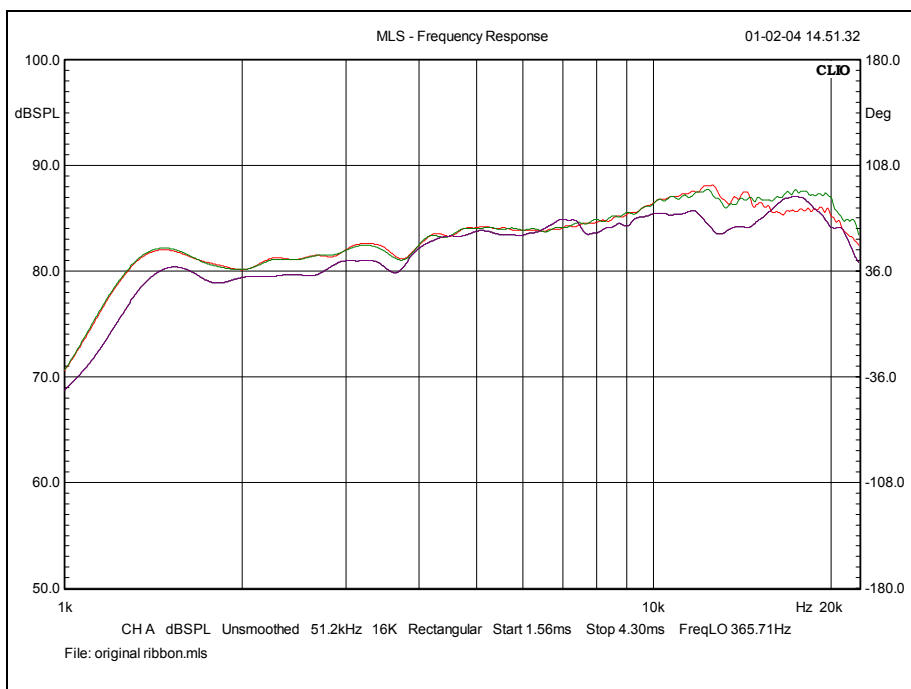
Insert ribbon between magnets and gently press the aluminium ribbon against the sticky glue at one end. Gently stretch the ribbon and attach at the other end. Make sure the ribbon does not touch the magnets. It can be close in some places, but it must not touch or it will buzz. Gently insert the lower wedge with the narrow end facing out. Insert upper T-block and middle wedge (narrow end facing in) and gently hammer the middle wedge in place.



If you stretch the ribbon too tight it will produce a peak at 13–14 kHz. Touch the ribbon gently at the middle and test it for elasticity. It must be able to bend slightly and retract to its former position but it must not droop in the magnet gap.



Blue curve is when the ribbon is too tight.
Red and green = response from two newly replaced ribbons.



Purple = original ribbon response (taken some months ago. Don't pay attention to different sensitivity here). Actually the homemade ribbons perform better than the original ribbons.

Ordinary thin household aluminium foil is 11 micrometers thick on these shores. Check yours. The original aluminium ribbon is only 9 μm giving approx. 1 dB higher sensitivity. This is no problem here as the sensitivity of the JP3 is some 95 dB. If you are using 5R6 for the series resistor in the Acapella, replace by 4R7. If you use 4R7, replace by 3R9 or 3R3.



Waste!

Fiddling around with 11 μm aluminium foil requires some practice. Fortunately the raw material comes for (almost) free and it only takes practice. Good luck!

Further tests:

1. If you have test equipment, insert 10 μF in series with the JP3 before performing the measurement. With the CLIO I'm using an output setting of -25dB to the power amp driving the tweeter.
2. If you want to check the polarity of the JP3 tweeter do like this:



Only connect the battery for less than a second and observe the ribbon movement. When the ribbon is moving OUT, the terminal applied POSITIVE voltage is the PLUS terminal.

The terminal with the red wire clip is NOT the plus terminal on the JP3 tweeter.

Troels Gravesen

troels.gravesen@stofanet.dk

28-09-2005:

I have received this mail from Mark:

I was googling and found your article about replacement ribbon in Fountek. I have built a lot of ribbon speakers of different configurations. At the moment, I am into building ribbon microphones. The constructions of ribbon tweeters and microphones are very similar. If you don't mind I have a few tips. One of the biggest problems is to make a good corrugator. I machined mine on a mill with indexing rotary table. However, I found this device: <http://www.dickblick.com/zz049/07/>.

It is not very good as a corrugator for microphones, where the foil is much thinner - I am working with 0.6-1.5um thicknesses. Basically, it just tears the foil. Another problem is a ribbon skewing. That is, the clearance in mics between ribbon and pole pieces is less 0.01", so the ribbon should be PERFECTLY straight. However, with something like thicknesses of 4um and up, this corrugator should work just fine. Make sure to get a metal one. The plastic is uneven in the middle. If you want to experiment with foils thinner than 11um household aluminium, look in older paper-in-oil capacitors. The thinnest I was able to find was 3.5um Illinois caps. The lower the voltage rating, the thinner material. Usually, it is about 6 um. Just unroll the thing, place on a clean glass, and clean with isopropyle alcohol. Do it outdoors. I heard it is not a good idea to breath odour from these babies.

Best regards, Mark

Thanks to Mark for the information.

Troels