EUCYDOME INSTRUCTIONS for DML Panels by Eucyblues September 2022

1/ Background:

When I started experimenting with DML panels of different materials, I began to consider the effect of the exciter piston being behind what may in some cases be a substantial thickness of material. It became particularly apparent to me when I tried a number of timber ply materials that there was a certain lack of brilliance in the highs and an impression on vocals that a certain crispness and clarity had been lost. The vocals sounded to me to be exactly where they were, i.e., behind the panel.

So, what if we could attempt to imitate a tweeter withing the panel without adding a second driver.

What immediately springs to mind is the dome of most tweeter diaphragms

I pause here to reflect on the importance of the dome shape.

In this article :
https://www.thebroadcastbridge.com/content/entry/9407/loudspeaker-technology-part-10-tweeters

John Watkinson explains the 'myth' of the dome tweeter, and reasons that the dome shape is irrelevant to the function of the tweeter. What he doesn't mention or consider is that the dome shape adds considerable strength and stability to the disc diaphragm, so that while the amount of curvature may not be functionally critical to the acoustic output, having a dome shape will/should assist in controlling breakup, and is certainly of fundamental importance in soft dome tweeters.

So, I commenced experimenting with dome shaped diaphragms.

I tried using a fabric dome using multiple layers of bonded nylon stocking material but I found no difference in the sound.

I tried forming a dome using heated mylar in a stretching frame but found it too difficult to achieve a satisfactory result.

That left aluminium as the only obvious remaining choice. I attempted to hand form domes using a panel beating hammer on a dolly but again it was too difficult to get a decent result. I therefore searched for existing products which may already have a dome shape and be of the right thickness.

Lo and behold – they are in use everywhere in the world – cheap and abundantly available!

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2/ Equipment and Materials:

You will need the following (‘or equal’)

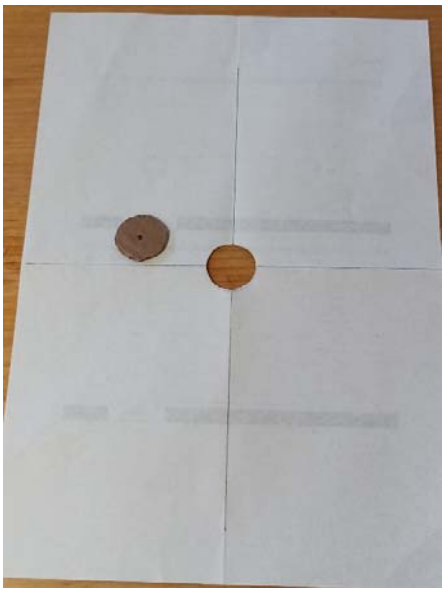
a) A Dremel or similar cutting tool with a thin metal cutting disc – preferably on a flexible drive shaft

b/ Masking tape

c/ A diamond or stone ‘whetstone

d/ Silicone – any type but some colour would be better than translucent

f/ A carboard disc cut to the size of the coil bobbin , and a paper template cutout approximately 2mm larger than the coil with the axes marked



g/ A permanent marker – fine tip

h/ Adhesive – whatever you use for gluing the exciter to the panel will/should suffice. I use a styrene based glue.

AND finally, the big reveal! - (Not so surprising really when you think about it)

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i/ You will need 2 of these for a stereo pair:

shutterstock.com · 168721325

The important bit is the BOTTOM!!

For there we have our almost ready-made domes.

shutterstock.com · 120308722

A 25mm domed disc cut from the base of a can such as this is 0.25mm thick and has a mass of 0.34 grams.

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3/ Process:

a/ Place your template in the centre of the can base and mark around with permanent marker

b/ Using the Dremel, carefully cut around the perimeter of the pen outline – stay close to the line but absolute precision is not required at this stage as long as you don't undercut the disc

c/ Using a file, round the cut edges as closely as possible to the marked pen line

d/ Lubricate the whetstone, (water with a diamond one), and using your finger/s, rub the cut disc back and forth until you achieve a flat surface around the edges. Check the underside marked line and keep rubbing until the inner grind surface is on the marked line. You will see some irregularities in the width of the grind surface if your initial cutting was a bit rough. Use a file and gently remove the sharp outer edge and round the disc to achieve a constant grind surface. This process will automatically give you a perfect circle.

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You will notice a faint marking on the pictured dome – in Aust at least, all cans have a faint imprint in the base of the dome – it will not affect performance.



e/ Mark the underside of the dome with a circle of half the diameter. This is my preferred location for a damping ring of silicone. I uses a small paintbrush to apply a thin ring of silicone around this line. You can experiment with this aspect. You may prefer to place a small blob in the centre of the dome but the ½ way ring lies on the first breakup mode of the dome. I tried a (very) thin layer of bitumen on whole underside but it deadened the dome too much so this was abandoned. Using a coloured silicone will help with seeing the layer as it is applied (no photo of this)

f/ The finished dome – - nice, round and flat mounting surface. A slight bit of swarf on the left to be removed.

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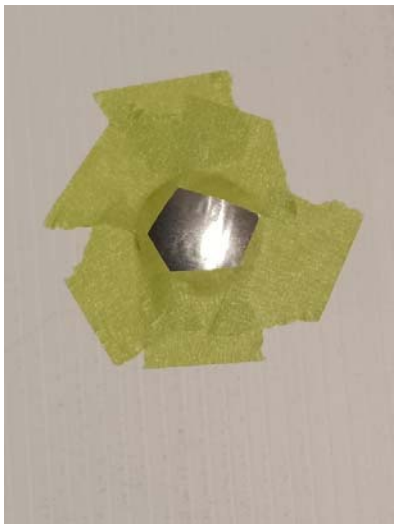
4/ Placement on the panel

a/ For Testing Purposes



At this stage of the proceedings, I measure where the centre of the exciter is and temporarily stick the dome to the panel with masking tape. This does not appear to affect the performance and it allows partial peel off to do a 'now it's on and now it's off' comparison.

Note that the dome is placed on the full panel surface. No hole is cut in the voice coil zone

(Although you could try it if you wish)

b/ Final Positioning and Fixing

Once the final exciter location is fixed, we need to ensure that the location is accurately transferred to the face of the panel.

To do this I 'crosshair' the centre of the exciter at the rear of the panel before gluing it on and drill a very small hole using a Dremel drill bit or diamond burr.

The paper cut-out mask shown in 2/ f/ above is then centred over the hole and taped down. The centre hole is then filled with glue.

Using a small piece of masking tape, make a finger grip 'handle' on the outer surface of the dome.

Wipe a THIN smear of your chosen adhesive around the rim of the dome, carefully centre the dome on the cut-out mask and press firmly into place. Allow to dry.

Glue or otherwise stick the exciter to the rear of the panel using the cross hairs to line it up.

DONE!

Optional – Spray the dome with lacquer of a chosen colour before fixing to the panel

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RESULTS

I have no doubt that this approach has yielded for me very positive results in mid-range and high frequency presence and clarity. Vocals seem to be brought forward to the front of the panel and sound much crisper. 'On and off' single frequency testing also shows a significant boost.

Damping levels need to be individually determined based on your panel materials – Despite the fact that the dome is backed by the panel material and the void is therefore sealed, the dome does vibrate, and ringing and harshness of undamped domes may still occur, while overdamping will destroy the effect, so be careful.

Please let me know what your findings are

Cheers

Eucyblues