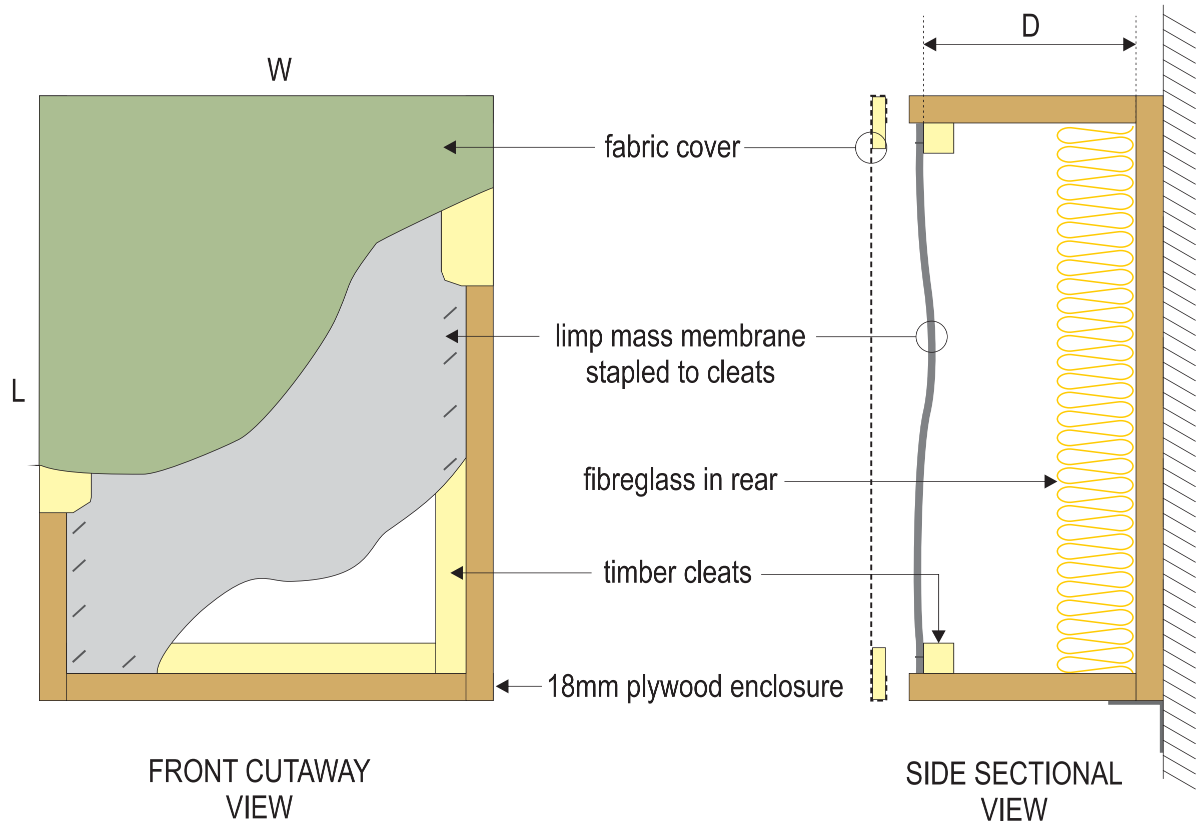
SIMPLE LIMP MASS BASS ABSORBER

by Tim Farrant

06/07/12



CALCULATING THE APPROXIMATE RESONANT FREQUENCY

$$f_o = \frac{600}{\sqrt{MxD}}$$

where M is surface density (mass) of membrane in kg/m^2
and D is depth of enclosure in cm

$$f_o = \frac{170}{\sqrt{MxD}}$$

where M is surface density (mass) of membrane in lb/ft^2
and D is depth of enclosure in inches

DESIGN NOTES

1] The limp mass membrane can be any flexible non-porous material. Barium loaded neoprene sheet and similar heavy flexible sheeting used for noise barriers is ideal. The higher the mass of the material means very low frequency absorbers can be made with relatively shallow enclosures. For example, a membrane with mass of 5kg/m across a box 30cm deep will resonate at approx 50Hz.

2] The box L x W is not critical but should be kept small compared to the wave length of the resonant frequency. The limp mass bass absorber is not effective beyond 300Hz for this reason. Typical L x W would be 60 x 40 cm for frequencies below 100Hz, and 40 x 30 cm for frequencies above 100Hz.

3] The enclosure must be airtight. The membrane should be sealed onto the cleats using a gap filling sealant. Test for airtightness by pushing the membrane in and observing it bulging out. The enclosures can be built directly onto the wall eliminating the need for a back panel but must be rigid. The fabric cover may be global to cover several enclosures.

4] Fibreglass thickness is not critical and it's presence lowers the "Q" of the absorber. For boxes with a depth greater than 20 cm, 50mm (2") building insulation can be used, for boxes less than 20cm 25mm (1") can be used. Avoid very high density fibreglass which will make the enclosure acoustically shallower than it really is.

5] Mount the bass absorbers into the corners of the room. Making various depth absorbers and mounting them in an alternating pattern will increase effectiveness. Mount very low frequency absorbers at the wall-wall-ceiling corner if possible.