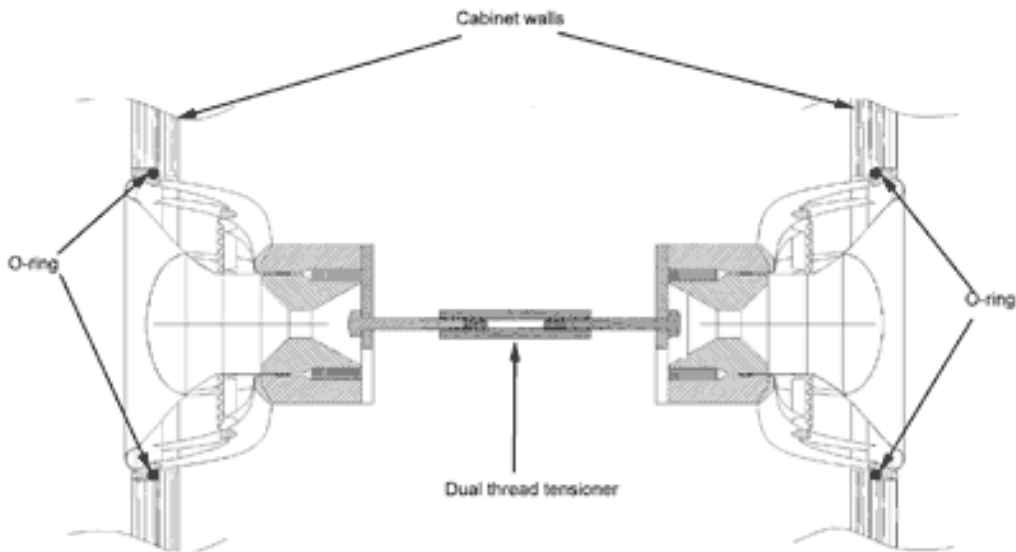


Reaction Canceling Compliant Mount



“Every action produces an equal and opposite reaction”. This simple Newtonian law of motion applies to all mechanical systems from rockets engines to loudspeaker motors. So when a current flows through the coil of a loudspeaker driver a force acts both upon it and the magnet surrounding it. The recoil velocity is proportionally smaller than that of the much lighter coil and cone and radiates a correspondingly small acoustic signal, that is, until it’s coupled to an enclosure having many times the area of the cone at which point its contribution can become significant. In addition to this simple area issue, if the cabinet suffers from structural resonances then the colouration may become a real problem.

All of which can be avoided by decoupling the driver from the cabinet by the use of compliant mounts. Except that in order to be effective, the resonant frequency of the driver on its mounts must be well below the low frequency cut-off of the system. Holding the driver by its outer flange and achieving such a compliant mount are fairly mutually exclusive requirements and an alternative approach is necessary.

A complete solution to the problem is to place identical drivers on opposite faces of the enclosure and couple the magnets rigidly together. So long as the drivers both receive an identical drive then the forces in the magnets will cancel completely and no motion will be transmitted to the enclosure. In our own reaction canceling full range systems the two drivers are driven with identical signals below 100Hz. This means that above this frequency a differential force begins to appear so the driver pair must still be decoupled from the cabinet but the mount need not be as compliant as if it had to work down to 20Hz and is, in any case, easily implemented with the use of a pair of elastomeric o-rings under each driver rim.