

acoustics, part II:

By Nick Colleran

cost-effective acoustical treatments for your home studio

Acoustic treatments for studios and control rooms fall into three categories: absorbers, barriers, and diffusers.

Acoustical absorbing materials, often called "fuzz," are open, airy, fluffy, and light materials that do not reflect sound. Perhaps the most common absorber is open cell urethane acoustical foam. This material is highly efficient and yields absorption coefficients above the theoretical limit due to the sculpted surface pattern. Although the flat surface area absorption may be limited to 1.00, the total surface is increased producing more total absorption than would otherwise be possible. While sound will not bounce back from absorbing materials it will pass through them with minimal loss.

Barriers to sound transmission are heavy, dense and massive materials. They include multiple layers of drywall (sheet rock), acoustical lead, and most recently mass loaded vinyl. The latter two materials are thin (one-eighth inch) but have sound transmission losses that exceed those of a two-inch solid core oak door. They offer the advantage of retrofitting an existing wall without heavy construction or loss of space. Barriers do little to absorb sound.

Diffusers are a means of acoustical crowd control. The object is to scatter the sound, not kill it. They are particularly useful for increasing the apparent acoustical size of a room and for broadening the "sweet spot" for mixing. Early diffuser designs, such as the polycylindrical seen on film scoring stages, take this a step further as they become bass traps below 500 Hz. This is particularly useful to small control rooms where sound can hit the rear wall at the mid-point of its cycle and return to cancel itself in the middle of the room.

Other odds and ends that are quite useful include sound sealant caulk and neoprene isolation pads. A crack at the intersection of a wall can cause a loss of 8 to 16 dB. If air or light passes through, then sound sneaks through as well. Resilient pads are necessary to decouple structures, float floors and walls. Sound travels through structures particularly well below 100 Hz, and isolating the structure by floating may be the only way to prevent this.

While acoustical foams are generally low cost and safe for home use, there are some other effective options. Moving pads work well to attenuate high-end leakage. Absorber panels can be made from compressed fiberglass ceiling tiles. When placed across a corner and lined with rock

wool, they make an effective bass trap. These materials should be covered with an acoustically transparent fabric to prevent glass particles from entering the breathing space. Chair cushions and pillows are also useful. In the past, budget studios have used egg cartons; however, the acoustical properties are not that good, and an open paper wall covering won't lower your fire insurance premiums.

There is little that can be done to stop sound transmission through walls other than increasing their mass

with extra drywall or barrier. If the walls are solid, however, door seals (including the gap at the bottom) and caulking will sometimes provide significant improvement.

Diffusers, particularly the polycylindricals, can be a good do-it-yourself project. A piece of 3/16" Masonite placed between two strips of 1" x 2" wood across a corner or centered on your rear control room wall will provide both high-end diffusion and bass trapping. A full 4' x 8' sheet that bows out at the center 6-7 inches will scatter sound over 180 degrees and have a center frequency of absorption at 63 Hz. The back of the panel should have absorbing material to dampen the resonance while the front surface will benefit from acoustical fabric such as Guilford of Maine FR701. The hard surface without the cloth produces a scraping fingernails-on-the-blackboard sound (not a lot, but very unpleasant).

Other styles of diffusers, such as the quadratic, can be approximated by use of a bookcase filled with books of different sizes and shapes in a symmetrical left and right pattern. A good selection of books can also impress your clients.

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