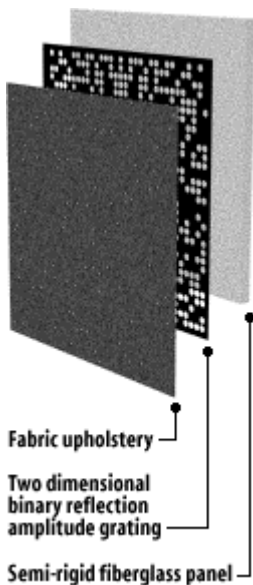


- Well balanced acoustical designs contain an appropriate combination of absorption, reflection, and diffusion. In many applications, however, limited budget or surface treatment thickness preclude the use of diffusion.
- Absorptive, fabric wrapped panels are specified for lack of an alternative. Unfortunately, wide area application may lead to an acoustically “dead” environment without “air” or ambiance.
- To solve this problem the Binary Amplitude Diffuser/Absorber simultaneously provides uniform sound diffusion at high and mid band frequencies and crosses over to pure absorption below the diffusive cutoff. The energy that is not diffused is absorbed.

This panel is a Binary Amplitude Diffuser consisting of a 31 x 33 element array of 1,023 0.5 sq. in. absorptive or reflective areas. The reflective areas (black in illustration top left) map to the “1” bit and the absorptive areas (white) map to “0”, or vice versa.

The resulting variable impedance surface forms a binary reflection amplitude grating. This is in contrast to reflection phase gratings which use phase variation, rather than amplitude variation, to provide diffusion.



The Binary Amplitude Diffuser (BAD) Panel provides diffusion about an octave above the frequency whose wavelength is twice the size of the binary element. This explains the limitation of traditional variable impedance arrays. For example, 1' x 1' panels provide diffusion up to about 1 kHz. Remaining high frequency reflections would still corrupt speech and music quality.

The BAD Panel consists of a binary mask attached to the face of a semi rigid fiberglass panel. The panel is upholstered in a decorative fabric to completely conceal the acoustical functionality.

The BAD Panel extends the acoustical performance of traditional absorptive fabric wrapped panels and allows wide area coverage without excessive deadening.

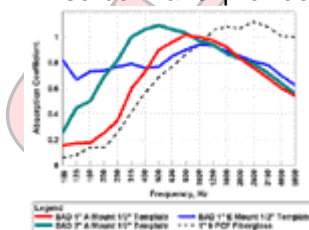
Acousticians now have a diffusive alternative to traditional purely absorptive fabric wrapped panels at competitive prices. The BAD Panel is ideal for any facility that needs reflection control from a decorative, upholstered, thin, and cost effective wall or ceiling panel.

Problem

Traditional fabric wrapped panels offer a cost effective, low profile aesthetic approach to providing reflection and reverberation control. However, these panels offer little sound diffusion and large area application may lead to an acoustically “dead” space. Variable impedance arrays offer some help, but cannot provide diffusion at mid and high frequencies.

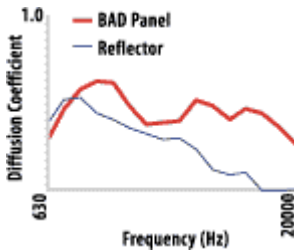
Solution

The B.A.D. panel is an innovative variable impedance fabric wrapped acoustic panel with a binary template consisting of reflective areas and holes over a semi rigid fiberglass panel. The resulting Binary Amplitude Diffuser Panel provides mid and high frequency diffusion and low frequency absorption.



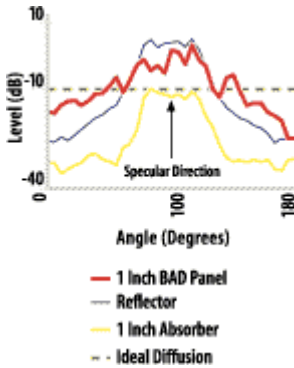
Absorption

The graph illustrates how the BAD Panel offers a modest increase in bass absorption over a standard upholstered 1" panel below 1000 Hz, and a decreased absorption above this frequency. The binary template allows the sound above 1000 Hz to be uniformly diffused providing reflection control without destroying the room's ambiance.



Diffusion

The performance of a scattering surface is characterized by the diffusion coefficient, which is the standard deviation of the 1/3 octave angular response, shown above at 12.5 kHz. The graph illustrates how uniformly the BAD Panel scatters sound across the frequency spectrum, compared to a reflective panel, for normal incidence.



Angular scattering response

For normally incident sound, the graph illustrates the angular response at 12.5 kHz. The flat reflector scatters sound primarily into the 90° specular direction. The wall mounted absorptive panel has similar response, only attenuated. The BAD Panel decreases specular scattering and more closely approaches the uniform ideal diffusion line.

Installation

Installation of the BAD Panel is quick and easy. Simply use construction adhesive, hook and loop fasteners, or supplied impaling, or Z, clips to mount to walls or ceiling.

The BAD Panel can also be used in any T-bar or similar mounting system.

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