HOW AN EXCITER WORKS

AN EXCITER FUNCTIONS LIKE A LOUDSPEAKER DRIVER WHERE THE CONE IS REPLACED BY A RIGID CONNECTION TO A SURFACE THAT WILL VIBRATE AND THEREFORE CREATE SOUND.

Exciters consist of a motor assembly, a voice coil, a suspension system, electrical connection terminals, and a coupling plate or ring that joins the voice coil to the mounting surface.

Unlike a loudspeaker that uses a frame and a cone diaphragm to couple vibrations to the surrounding air, the exciter uses the movement of itself to apply force from the voice coil to the mounting surface, which is usually flexible enough to vibrate and produce sound.

The exciter works by exciting a surface at a single point. Unlike a loudspeaker driver, where the cone moves essentially in unison with the voice coil, most surfaces are not rigid enough to conduct the exciter’s force evenly across their entire surface area, so they often vibrate in a chaotic manner as longitudinal sound waves travel through the surface itself. The material type, exciter placement, and edge termination of the surface all affect the sound properties of a surface, though exciters can give acceptable results when mounted on nearly any kind of surface.
MATERIAL SELECTION FOR EXCITERS

The ideal material for mounting an exciter is a thin, lightweight sheet of material with high compressive strength and moderate to high bending strength.

The compressive strength of the material has the greatest effect on the treble extension of the resulting ‘speaker’ (affecting ‘detail’ and ‘air’), while the bending strength of the material influences the midrange and low frequency efficiency of the ‘speaker’.

Excellent materials to use for exciter mounting include:

- Aluminum
- Foam Board
- Corrugated cardboard sheet
- Corrugated plastic ‘signboard’ material

Other materials which are less ideal but still workable include:

- Plexiglas
- Glass windows
- Mirrors
- Ceiling tiles
- Wallboard
- Plywood/MDF/OSB sheets

Materials which may not give desirable results:

- Metal panels
- Concrete
- Wooden beams
- Soil

MORE TIPS

- Using a larger panel or installing the exciter to a larger surface will provide deeper bass response.

- A non-magnetic material should be chosen for the exciter mounting surface; mounting the exciter to a magnetic material may interfere with the magnetic circuit of the exciter’s motor assembly and impair performance.

- Suspending a panel at a central location will reduce bass response; exciter placement should be chosen to be between central mounting points and panel edges, instead of placing the exciter close to the central mounting point.
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EXCITER PLACEMENT AND INSTALLATION

Once the mounting surface material, shape, and size are known, the exciters can be placed. Exciter placement is critical to achieving great sound.

For the best results, exciters should be placed near the center of the surface, but should be offset from each edge of the surface so that the distance from the exciter to the edge is not an even multiple of the distance from the exciter to another edge of the panel, in order to avoid the buildup of standing waves.

THE GOLDEN FORMULA...FOR RECTANGLES

For mounting exciters to a flat rectangular panel the width of the panel should be less than 4/5 of the height, or vice versa, and good results will be given with the exciter mounted a distance of 2/5 of the panel width from one side of the panel, and 3/5 from the other side of the panel, with the same relationship used for exciter placement with respect to the panel height.

Referenced - Dayton Audios: Tech Note: Understanding Exciters – Principles and Applications