

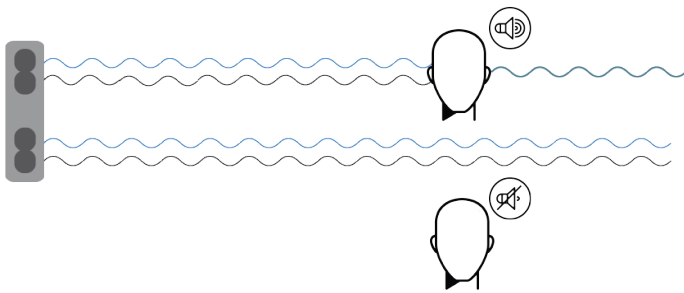
BACKGROUND INFORMATION

Analogue directional speakers: How to make and test different types of parabolic reflectors? (TfCD)

DIRECTIONAL SPEAKER

With a directional speaker (parametric speaker) it is possible to focus audio on a specific area, so that people present inside this area can only hear it. This can be compared to a stage spotlight, where light is focused on a specific place on stage, whereby the rest of the stage remains dark. Directional speakers are, for example, being used in museums and galleries to target audio information or sound at the spectator of a specific piece only (Gibbs, 2014; Joseph Pompei, n.d.; Woodford, 2014).

Directional speakers work differently from conventional speakers. The latter only produces audible sound waves by a moving electromagnetic coil and cone. Directional speakers use piezoelectric transducers to create ultrasound: sound waves with a high frequency and therefore a short wavelength (Woodford, 2014). High frequency sound has a higher directivity than low frequency sound (Joseph Pompei, n.d.). Directional speakers are build out of multiple small transducers in order to let the sound spread out less than with a large one. Ultrasound is too high to be heard by the human ear. The ultrasound wave actually consists of two separate ultrasound waves. In case they meet an obstacle, the sound waves subtract from each other and this results in a third sound wave with a much lower frequency. The human ear can hear this third wave. (Woodford, 2014)



Directional speaker: based on high frequency sound waves

PARABOLIC SPEAKER

Acoustically directional speakers are the same as parabolic speakers: they focus sound into a small area (Wikipedia, 2015a). Parabolic speakers consist of a reflector in which sound waves are reflected into one direction (Wikipedia, 2015b). On average parabolic speakers are less heavy and less expensive than directional speakers (Wikipedia, 2015a). The speaker is focused in such a way it sends out the sound in the direction of the parabola, in order to let the sound waves reflect into this shape. The speaker needs to be placed in the focal point of the parabola (Wildtronics, n.d.).

DETAILS FOR MAKING YOUR OWN PARABOLIC REFLECTOR

There are a couple of material properties, which can be used in your advantage while making a parabolic reflector. Adding clay, as done in the instructable, adds mass to the reflector. This is done because a rigid surface with a lot of mass reflects sound waves better, because the sound waves cannot travel into the surface very far. The same counts for a flat and smooth surface (Build, n.d.). Therefore it is desired to add the aluminum layer as smooth as possible. Aluminum foil is added because aluminum is highly reflective and often used for sound reflection (Ballou, 2015).

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