SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF MECHANICAL ENGINEERING

CONSUMER ELECTRONICS

Guess Today's Topic????

WOOFERS

A woofer or bass speaker is a technical term for a loudspeaker driver designed to produce low frequency sounds, typically from 50 Hz up to 1000 Hz. The name is from the onomatopoeic English word for a dog's bark, "woof"[1] (in contrast to the name used for loudspeakers designed to reproduce high-frequency sounds, tweeter). The most common design for a woofer is the electrodynamic driver, which typically uses a stiff paper cone, driven by a voice coil surrounded by a magnetic field.

WOOFERS

The voice coil is attached by adhesives to the back of the loudspeaker cone. The voice coil and the magnet form a linear electric motor. When current flows through the voice coil, the coil moves in relation to the frame according to Fleming's left hand rule for motors, causing the coil to push or pull on the driver cone in a piston-like way. The resulting motion of the cone creates sound waves, as it moves in and out.

WOOFERS

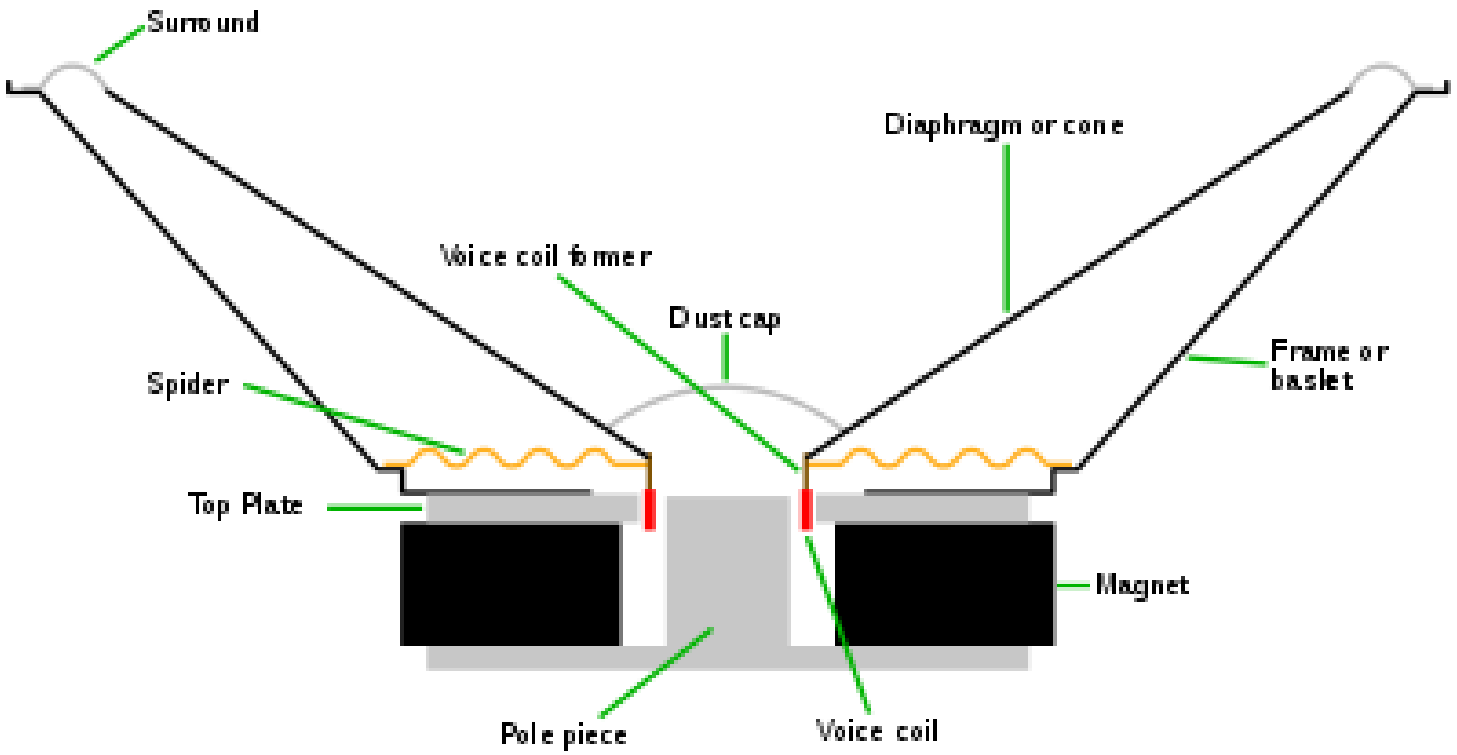
At ordinary sound pressure levels (SPL), most humans can hear down to about 20 Hz.[2] Woofers are generally used to cover the lowest octaves of a loudspeaker's frequency range. In two-way loudspeaker systems, the drivers handling the lower frequencies are also obliged to cover a substantial part of the midrange, often as high as 2000 to 5000 Hz; such drivers are commonly termed mid woofers. Since the 1990s, a type of woofer (termed subwoofer), which is designed for very low frequencies only, has come to be commonly used in home theater systems and PA systems to augment the bass response; they usually handle the very lowest two or three octaves (i.e., from as low as 20 to 80 or 120 Hz).

WOOFERS

Good woofer design requires effectively converting a low frequency amplifier signal to mechanical air movement with high fidelity and acceptable efficiency, and is both assisted and complicated by the necessity of using a loudspeaker enclosure to couple the cone motion to the air. If done well, many of the other problems of woofer design (for instance, linear excursion requirements) are reduced.

In most cases the woofer and its enclosure must be designed to work together. Usually the enclosure is designed to suit the characteristics of the speaker or speakers used. The size of the enclosure is a function of the longest wavelengths (lowest frequencies) to be reproduced, and the woofer enclosure is much larger than required for midrange and high frequencies.

WOOFERS


Surround
Diaphragm or cone
Voice coil former
Dust cap
Frame or basket
Spider
Top Plate
Magnet
Pole piece
Voice coil

WOOFERS

A crossover network, either passive or active, filters the band of frequencies to be handled by the woofer and other speakers. Normally the crossover and speaker system, including the woofer, are expected to convert the electrical signal supplied by the amplifier to an acoustic signal of identical waveform without other interaction between the amplifier and speakers, although sometimes the amplifier and speakers are designed together with the speakers supplying distortion-correcting negative feedback to the amplifier.

WOOFERS

There are many challenges in woofer design and manufacture. Most have to do with controlling the motion of the cone so the electrical signal to the woofer's voice coil is faithfully reproduced by the sound waves produced by the cone's motion. Problems include damping the cone cleanly without audible distortion so that it does not continue to move, causing ringing, when the instantaneous input signal falls to zero each cycle, and managing high excursions (usually required to reproduce loud sounds) with low distortion. There are also challenges in presenting to the amplifier an electrical impedance which is not too far from constant at all frequencies.

An early version of the now widely used bass-reflex cabinet design was patented by Albert L. Thuras of Bell Laboratories in 1932

WOOFERS

In 1965, Sennheiser Electronics introduced the Philharmonic sound system, which used electronics to overcome some of the problems ordinary woofer subsystems confront. They added a motion sensor to the woofer, and used the signal corresponding to its actual motion to feedback as a control input to a specially designed amplifier. If carefully done, this can improve performance (both in 'tightness', and extension of low frequency performance) considerably at the expense of flexibility (the amplifier and the speaker are tied together permanently) and cost. In the US, L W Erath, an oil industry engineer, introduced a line of high end speakers along very much the same lines.

As electronics costs have decreased, it has become common to have sensor-equipped woofers in inexpensive 'music systems', boom boxes, or even car audio systems. This is usually done in an attempt to get better performance from inexpensive or undersized drivers in lightweight or poorly designed enclosures. This approach presents difficulties as not all distortion can be eliminated using servo techniques, and a poorly designed enclosure can swamp the benefits from any attempt at electronic correction.


Thank
you