

Ribbon Loudspeakers

The Sound of Seduction

The physics behind ribbon speakers



Fundamental physics explains why the ribbon is the perfect type of transducer. Instead of using a cone attached to a voice coil suspended in a magnetic field, a ribbon driver uses a strip of aluminum foil ribbon as a diaphragm. It is suspended between the opposite poles of two magnets. As the signal current passes through the electrically conductive ribbon, it interacts with the magnetic fields. This causes the ribbon to move back and forth, creating sound.

The ribbon serves both as voice coil and diaphragm. Every part of the ribbon is driven directly and simultaneously without any energy loss. At very high frequencies the ribbon radiates horizontally but not vertically. In the listening room one hears more direct sound from the loudspeaker and less reflection from the sidewalls and ceiling.

Reduced wall reflections aid in sound staging. Pinpoint imaging and the ability to project a concert hall's acoustic signature are hallmarks of good ribbon loudspeakers.

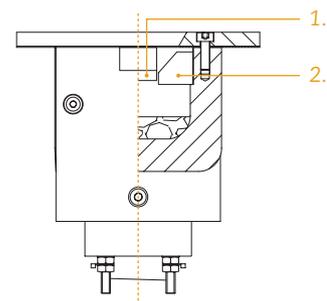
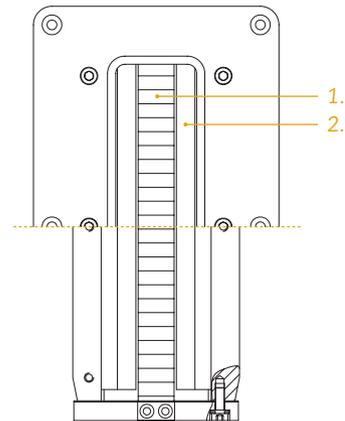
Advantages over conventional speakers

A ribbon tweeter has notably less mass. It may have one quarter the mass, but ten times the radiating area of a dome tweeter's diaphragm. With its low mass over area ratio, ribbon drivers respond faster to input signals. This ability to instantly accelerate or decelerate allows them to reproduce transient musical information accurately.

Ribbon loudspeakers are characterized by their remarkable ability to produce extremely clean and quick transients, such as those of plucked acoustic guitar strings or percussion instruments. The sound seems to start and stop suddenly, identical to the sound generated by live instruments. The sound also has an openness, clarity, and transparency often unmatched by conventional loudspeakers.

Another advantage resulting from the low mass to surface area ratio is the ability to accurately reproduce high frequencies. Conventional loudspeakers normally max out at 20kHz. It is harder to keep mass under control as frequency increases – and cone drivers are by design heavier than ribbon diaphragms. For example, it would be possible to bring a cannon ball to 20kHz, but you might need a power source the size of a boat to drive it.

In comparison, the Aurum Cantus G2 tweeter can reach 40kHz with just a few watts of amplification. The high frequency range is where the lifeblood of most music resides. This is where sounds are the most delicate. This is where the key emotion of a piece does its seduction. Ribbon loudspeakers generally form a better emotional link with the listener given their excellent performance at high frequencies.



1. Aluminium ribbon diaphragm
2. Rare Earth/Neodymium ferrite-boron magnets

Top: Section view from front
Bottom: Section view from above