

Why Do Speakers Blow Up? Some Sound Advice

Many of us have had the experience – the sound suddenly stops coming out of one or both speakers! The diagnosis is not good and usually not cheap to fix. Why does this happen and how you can avoid the pain.

Well, the problem with all amplifiers (excluding valve amplifiers which behave slightly differently) is that when they reach the limit of their rated power, a rather drastic thing happens. But before going any further, it is important to remember here that the limit to an amplifiers power is almost **ALWAYS** reached well before the volume control (if it has one) is turned to the maximum.

It is also important to realise that the level of a typical signal varies by a staggering amount. This is called the “Dynamic Range” of a signal and it is no big deal that one part of a signal is 1000 times stronger than the next. That is why signal levels are expressed as logarithmic, or on the decibel (dB) scale. The volume control on an amplifier (or from a mixer etc) sets a level for an **AVERAGE** signal level. It is quite common for example, that a Hi-Fi amplifier set on say “half volume”, will occasionally process peak signals that go way beyond its power capability when driven from a wide dynamic range source such as a CD or DVD player.

The Dynamic range of modern recordings can be quite staggering, when coupled with solid-state electronics driven by digital sources such as DVD/CD players. This combination can provide enormous enjoyment; however it is critical to understand that this combination has the capability to destroy any loudspeaker, regardless of cost, either by overheating



or by exceeding the mechanical capabilities of the drivers.

When a transistor, mosfet or bipolar amplifier (it doesn't matter what type) processes a signal peak that is greater than its ability to completely amplify it, the level of the signal is ultimately limited to the internal DC power rails. In other words if the DC power rails on the amplifier are +/-35V then signal output voltage cannot exceed that (a bit less really).

When a sine wave signal (for clarity) reaches the limits of the power supply rails, the tops of the sine wavers are "flattened" because the voltage limit of the power supply rail has been reached. The signal still goes through to the speakers with the flattened tops. This phenomenon is called "clipping".



Construction of Cabasse TC22 Speaker

This Presents A Serious Threat To The Life Of The Speaker.

The flattened 'bit' at the top and bottom of the signal is in fact raw DC across the speaker voice coil, positive one instant, negative the next. The DC causes the voice coil to heat up rapidly, cooking the insulating enamel on the wire and burning away the adhesive holding the assembly in place. How long the voice coil will survive under these conditions depends on many factors; the repetition rate and time duration of the DC component of the signal is the most important, but voice coil construction magnet size and ambient temperature also have a bearing.

PA, HI-FI and car speakers are all at risk. It does not matter whether it is an expensive European, American or lower cost Asian product, they are all vulnerable.

You can generally hear that an amplifier is clipping quite easily. The sound from the speaker becomes very harsh. The first thought is that the speaker is overloaded, after all, the sound is emanating from them. On the other hand, when a big amplifier is in use with a small speaker, genuine overload sounds far less harsh, and is not nearly as dangerous to the speaker. In 9 times out of 10, our experience has shown that what sounds like speaker overload is in fact amplifier clipping. Unlikely as it sounds, it is easier to destroy a 200W speaker with a 35W amplifier, than a 100W speaker with a 200W amplifier!

When buying speakers, make sure you advise the salesperson if you intend to play the music loud, even for just a few minutes a year! We often hear folk tell us at the repair counter that they only played it loud once. Well, once is all it takes! Maybe you need to purchase speakers with a higher efficiency or a better amp. Don't second guess this. Good audio sales people know what can happen and can maybe advise on speaker/amp combinations that will better cope with the volumes you intend to play your music – even if this is just occasionally.

Conclusion

Damage caused to a loudspeaker in this manner is not a warranty item under any circumstances. But by exercising sound engineering practice and common sense, then this does not need to happen to you!

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