

## Maximum Power Output Varies With Mains Voltage

I'm not sure if this has been asked before. I've heard that an amplifier will output more power when the AC mains voltage is higher. Does this also apply to CD/DVD players and PC sound cards etc or do they have a fixed output voltage regardless of the AC voltage? (N. O., via email).

- Most power amplifiers derive their power from the 230VAC mains via a transformer. This provides isolation from the mains and steps down the voltage. The power amplifier supply rails therefore can vary depending on the mains supply voltage. This can mean the amplifier is capable of delivering more power if the mains voltage is high compared to when it is low.

Power amplifiers that are operated from batteries such as in portable radios and car power amplifiers can

also output more power when the battery voltage is highest. For cars, this means more power when the battery is charging at around 14.4V compared to when the battery is not being charged and at about 12V.

In fact, the variation with input supply voltage can make a significant difference to the maximum power output that can be delivered by an amplifier. For the DC example above, where the supply voltage is changed from 12V to 14.4V, that is a variation of 20%. However, since power output is proportional to the square of the voltage, the maximum power output that could be delivered by the amplifier would increase by 44% in theory. In practice the increase would be not quite that large but it is still quite significant.

However, there is a little more to

the story and the amplifier would only sound slightly louder before the onset of clipping. The reason for this is that hearing is logarithmic in response and since an increase in power output of 44% is only +3dB, it is not a large increase in perceived loudness.

For an amplifier to sound significantly louder, the power difference needs to be around +6B or more, ie, an increase of two or more.

For low-power amplifiers and signal sources such as those found in CD/DVD players and computer sound cards, the supplies are regulated to a fixed voltage. This means that they don't vary with the external power supply (such as the 230VAC mains or a battery). The output from these items is therefore unaffected by mains voltage changes.