

## Re: polar vs nonpolar capacitors

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- *From:* [et472@xxxxxxxxxxxxxxxxxxxxxx](mailto:et472@xxxxxxxxxxxxxxxxxxxxxx) (Michael Black)
  - *Date:* 28 Nov 2005 19:26:59 GMT
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"Dave" ([dspear99ca@xxxxxxxxxxxxxxxxxxxxxx](mailto:dspear99ca@xxxxxxxxxxxxxxxxxxxxxx)) writes:

> I am interested in upgrading some audio components, and a lot of DIY tweak  
> mention "replace the electrolytics in the signal path with Black Gate or  
> other low-noise nonpolar capacitors." I know that polar capacitors cannot  
> tolerate reversed polarity, and that bi-polars can as they are really two  
> back-to-back capacitors. What is a non-polar? How is it different from a  
> bipolar?  
>  
> Dave  
>  
>

Well, it must be a non-polarized capacitor.

Polarized capacitors exist not because of function but because of manufacturing process.

There is no need for polarized capacitors.

But, in order to have higher value capacitors in reasonable sized packages, the manufacturers have to switch to methods that result in a polarized capacitor. The capacitor itself objects if the wrong polarity is applied.

For a lot of applications where higher value capacitors are required, that they are polarized doesn't matter, because they are mostly used where there is indeed a well defined DC voltage applied to one of the terminals. Thus, for filter capacitors in that power supply, a polarized capacitor doesn't matter because you connect the capacitor from a positive voltage to ground, so it's all very clear. A coupling capacitor on the output of an amplifier running off only a positive voltage has a positive voltage on that output, so again it's clear.

In a few cases, the capacitor won't actually see a clearly polarized voltage source. Crossover capacitors in speakers are a prime example, because the DC component has already been removed, either because the amplifier feeding the speaker has a DC coupling capacitor on the output, or has a transformer on the output (not likely in recent decades). Here, there is no longer an AC voltage riding on a DC voltage,

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so no matter what the AC voltage one side of the capacitor is clearly more positive than the other; there is an AC voltage coming into that capacitor, moving from positive to negative and back, in reference to the other side of the capacitor. You need a non-polarized capacitor there, but the issue of size and capacitance comes into play, and most capacitors of the values needed will be electrolytic. A common trick is to put two polarized capacitors in series, and sometimes they are manufactured that way, so the capacitor is not polarized.

But there are issues with that sort of scheme. For someone fussing with types of coupling capacitors in audio circuitry, they want non-polarized capacitors. Thus the capacitors need to be manufactured using some scheme that will not inherently result in a polarized capacitor. If the values are low enough, this is not an issue. If the values of capacitance are higher, then one has to hunt around capacitors of mylar or polystyrene or some other scheme that does not result in a polarized capacitor, and the result may be a larger capacitor because those other formulations can't be so compact.

Michael

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- *Follow-Ups:*

- ◆ *Re: polar vs nonpolar capacitors*

- ◇ *From:* Pooh Bear

- *References:*

- ◆ *polar vs nonpolar capacitors*

- ◇ *From:* Dave

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