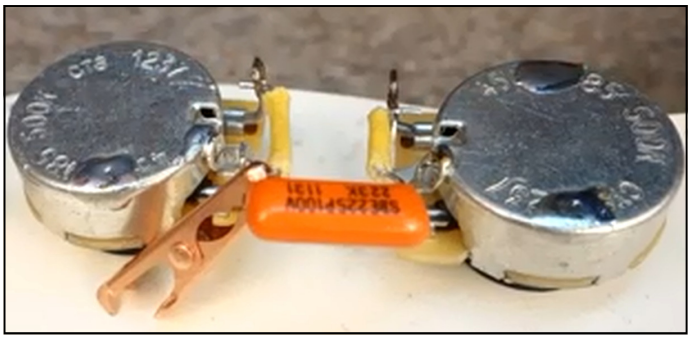
Guitar Tone Caps - why you should NOT use foil capacitors!

Background

When electric guitars were first introduced with 'on-board' volume and tone controls, the tone control was equipped with a 'wound foil' capacitor. Because the capacitor is made using a long length of coiled up aluminium foil, sandwiched inside a thin polyester or Mylar membrane, the capacitor has a small amount of undesired 'inductance' as well as the desired capacitance.



Explanation

In the professional electronics world, it has long been known that a 'coil' of inductive material like this can be very attractive to radio frequency transmissions from far off shortwave radio stations, taxis, aircraft, etc. This is why most radio sets working on the old Long, Medium and Shortwave frequency bands employ coils of wire inside them. They are used to help tune in the stations and could not work without them.

The guitar's Tone control capacitor's capacitance combined with this small amount of inductance forms what is known as a 'resonant tuned circuit' - just like inside the radio set. That tuned circuit's resonant frequency is often coincident with the transmissions from radio stations or other broadcasters.

When 'ceramic' capacitors came along, the industry quickly changed to them… for two reasons. They were cheaper and, more importantly, they are **NOT inductive**. Therefore, switching to these meant that the risk of induced unwanted interference from far off shortwave radio stations was practically eliminated!

"Foil Capacitors Are A Must Have Tone Improvement!"

Take my word as an electronics professional, that's simply not true! "But we're told that foil capacitors are essential for great guitar tone." Well, yes, they are better quality for good high frequency applications, but they are only brought into use when the tone control is set to minimum treble. In which case the treble control, through its capacitor, is shorting all the high frequencies to ground. You don't need a high quality capacitor for this purpose. So you'll never hear their superior performance… ever!

At maximum treble, the capacitor is out of circuit entirely but can still induce RF (radio frequencies) into the instrument.

Before you decide to rip out that 'ceramic' capacitor, think carefully about what I have said! Save your money and do not install 'bumble bee' or 'orange drop' capacitors. You could find, depending on where you live or how close you are to radio transmitters, that installing them will make radio interference more of a problem. Even the time of the year can make RF interference much more prevalent… so why increase the risks?

Ceramic capacitors are used extensively (or should be) inside guitar amplifiers too. They are used to decouple (short to ground) RF from the power supply rails. This job cannot (should not) be done with foil capacitors for the same reasons already given! CERAMIC CAPS ARE NOT NASTY EVIL THINGS AT ALL!

"Foil Caps Are Best, Everyone Says So!"

Sadly, there's a lot of 'opinion' out there, but forums are the best place for misinformation. They are where 'semi-skilled brain surgeons' live! And in any case, because something is widely believed, doesn't make it right! People believed the world was flat once… now, there was a surprise!

To avoid RF interference… I urge you to save your money and do not install 'bumble bee', 'orange drop', or like capacitors into your guitar!

Stewart Ward - Guitar amp designer since 1967

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