

Re: Highest energy cap that's available in hobby volumes .. maybe a few hundred pieces

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- *From:* Terry Given <my_name@xxxxxxxx>
 - *Date:* Fri, 30 Jun 2006 17:37:02 +1200
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Ancient_Hacker wrote:

John Larkin wrote:

A big array of series/parallel electrolytics, like photoflash caps, doesn't need equalizing resistors. Electrolytic leakage is nonlinear enough to balance the voltages nicely. 'lytics don't fail suddenly like film caps, they just start leaking more.

Oh, joy, a voice of reason. All the old ARRL Handbooks and many other books specify that you should put equalizing resistors across electrolytics and diodes too. With a little reflection you can convince yourself pretty thoroughly that this is a poor idea. Electrolytics and diodes are kinda like zeners- they'll self-limit the voltage across themselves to a value they can handle. If you add equalizing resistors you're just forcing the undervoltage-formed capacitors to dissipate more power.

I have some experience with this, at the 10kJ level using 450V electrolytics in a 800V DC bus. they had 100k "balancing" resistors. which drew about 1/2 of the nominal leakage, and so did nothing. and even if they did, its only at DC; suck a wallop of current out, and watch the voltage distribute itself according to capacitance ratios. hardly surprising.

it got really interesting when we gassed the equipment with pressurised Methyl Bromide (Kids, dont do this, its a BAD thing). the +ve (IIRC; cant remember, cant be bothered working it out) cap terminal internal connection (very pure Al) corroded away very rapidly, leading to massive imbalances in the series-parallel stacks. At power-on the inrush "limiting" circuit limited peak inrush to 900A = peak rated current. This thump was big enough that the aforementioned cap value "balancing" occurred, over-volting the shit out of some caps, which failed spectacularly (eg smashing a 1800V 300A SCR half-bridge physically to pieces). One 1,700A 400V drive did this whilst I stood beside it; the enclosure door nearly hit me, and I came close to shitting my pants.

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In 5 18-hr days me and 4 guys replaced 2,000 capacitors in-situ. I personally hacksawed each one open. it was really interesting when we were working on the winch drives on the dredge, which got blown into the middle of the lake. 2m swells, and a tiny dinghy, with all the test gear on shore. The only way back was to power up the rebuilt drives, sans test gear, and cross our fingers. After ensuring the plant supervisor would take the rap (\$\$\$) if any failed, which they didnt.

It was funny in that I was on the bridge, and noticed we were moving. I mentioned this, and was told we were not. To which I replied "OK, we arent, but the shore is." That got their attention. The wind was so strong it pulled the D9 bulldozer that was used as a mobile anchor into the 30m deep "lake". It was the 3rd one they had lost....

Cheers

Terry

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